

Oral surgery : a text book of diseases of the mouth intended chiefly for the use of students of dentistry / by Edmund W. Roughton.

Contributors

Roughton, Edmund W.

Publication/Creation

London : J.P. Segg and Co.; Philadelphia : S.S. White Dental Manufacturing Co., [between 1890 and 1899?]

Persistent URL

<https://wellcomecollection.org/works/dys7yt6z>

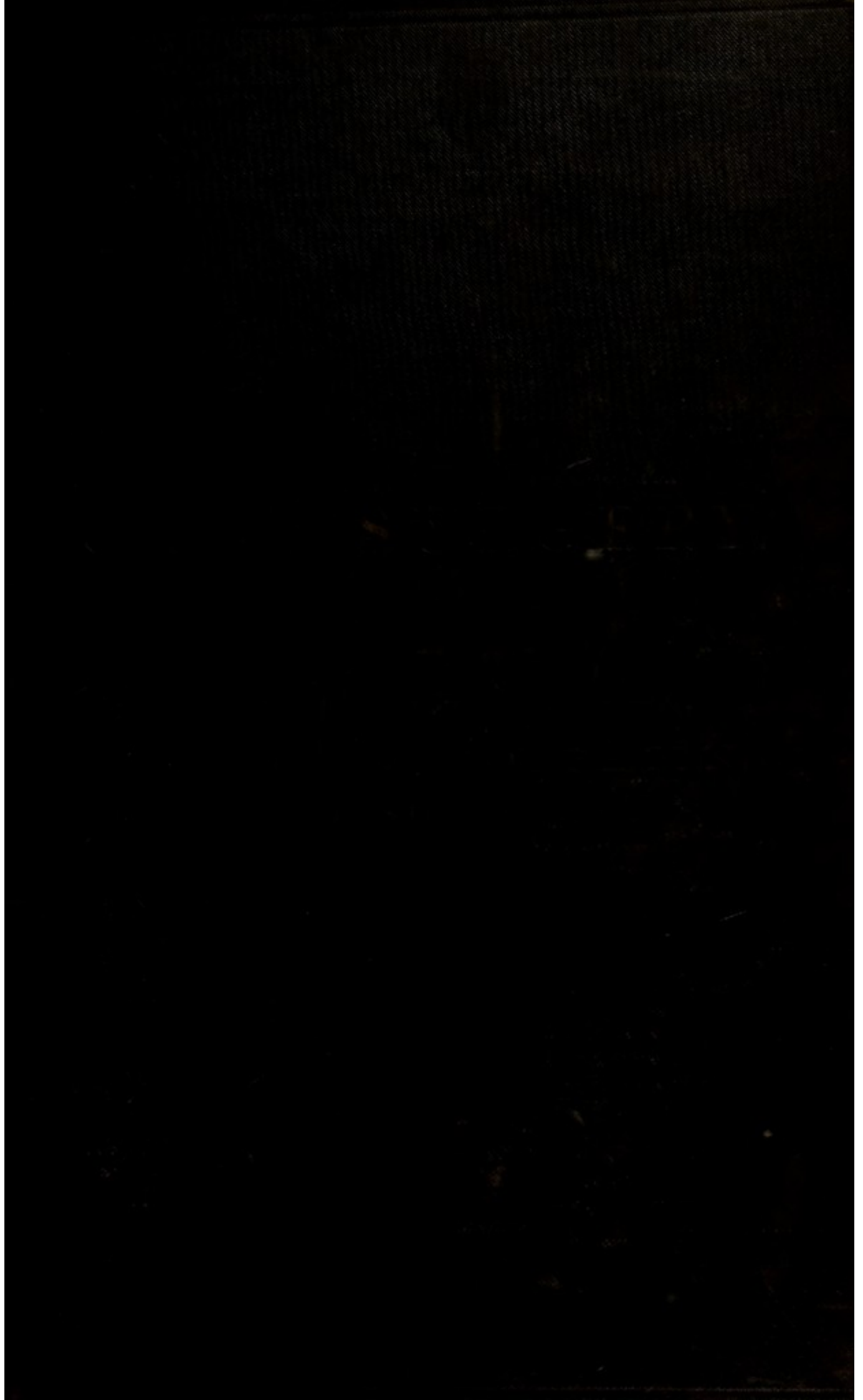
License and attribution

This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.



Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
<https://wellcomecollection.org>





22101915317

H. H. G. GRATTAN,
MEDICAL BOOKSELLER
BY APPOINTMENT
TO
GUY'S AND ST. THOMAS'S
HOSPITALS.
THE TABARD BOOK STORE,
17, THE BOROUGH,
LONDON BRIDGE.

P. P. Cole.

Med
K49289



ORAL SURGERY.

A TEXT BOOK
OF DISEASES OF THE MOUTH.
INTENDED CHIEFLY FOR THE USE OF
STUDENTS OF DENTISTRY.

BY

EDMUND W. ROUGHTON,
B.S., M.D., (Lond.) F.R.C.S. (Eng.)

*Assistant Surgeon, and Surgeon-in-Charge of the Throat and
Ear Department, Royal Free Hospital ;
Honorary Visiting Surgeon, National Dental Hospital.*

ETC.

WITH SIXTY-EIGHT ILLUSTRATIONS.

PUBLISHED BY

J. P. SEGG & CO, 289 & 291, REGENT STREET,
LONDON, ENGLAND ;
S. S. WHITE DENTAL MANUFACTURING CO., CHESTNUT STREET,
PHILADELPHIA, PA., U.S.A.

All Rights Reserved.

[189-?]

11342.201



WELLCOME INSTITUTE LIBRARY	
Coll.	walM0mec
Call	
No.	WU

PREFACE.

The following pages have been written with the object of furnishing a concise account of the diseases of the tissues and organs which are near or closely related to the teeth. They are intended chiefly for the use of dental students preparing for their final examination, but it is hoped that they may sometimes be of use to the practitioner to whom examinations are no longer a source of interest or anxiety.

It is very difficult to decide how much surgery a candidate for a dental diploma should reasonably be expected to know. Whilst there can be no doubt that a knowledge of pathology and the general principles of medicine and surgery is as essential to the dentist as to any other specialist, opinions will vary widely as to the acquaintance he should have with diseases which he will sometimes see but will seldom or never be called

upon to treat. In the present work the author has endeavoured to present to the student such information as will be of use to him in the practice of his profession as well as in the examination room, whilst he was excluded subjects, a perusal of which would only occupy time and attention which could more profitably be bestowed on the study of his specialty.

38, Queen Anne St., W.

CONTENTS.

	PAGE
<i>CHAPTER I.</i>	
FRACTURES OF THE MANDIBLE. FRACTURES OF THE MAXILLA	1
<i>CHAPTER II.</i>	
DISLOCATION OF THE MANDIBLE	15
<i>CHAPTER III.</i>	
PERIOSTITIS OF THE JAWS	22
<i>CHAPTER IV.</i>	
ALVEOLAR ABSCESS	31
<i>CHAPTER V.</i>	
NECROSIS OF THE JAWS	42
<i>CHAPTER VI.</i>	
EMPYEMA OF THE MAXILLARY ANTRUM	56
<i>CHAPTER VII.</i>	
ODONTOMES	67
<i>CHAPTER VIII.</i>	
TUMOURS OF THE GUMS	84

	PAGE
<i>CHAPTER IX.</i>	
TUMOURS OF THE PALATE	91
<i>CHAPTER X.</i>	
TUMOURS OF THE MAXILLA	98
<i>CHAPTER XI.</i>	
TUMOURS OF THE MANDIBLE	114
<i>CHAPTER XII.</i>	
LEONTIASIS OSSEA. ACROMEGALY. OSTEITIS DEFORMANS	126
<i>CHAPTER XIII.</i>	
ACTINOMYCOSIS	132
<i>CHAPTER XIV.</i>	
DISEASES OF THE TEMPORO-MAXILLARY JOINT ...	137
<i>CHAPTER XV.</i>	
FIXITY OF THE MANDIBLE	141
<i>CHAPTER XVI.</i>	
STOMATITIS	145
<i>CHAPTER XVII.</i>	
SYPHILITIC AND TUBERCULAR AFFECTIONS OF THE MOUTH	153
<i>CHAPTER XVIII.</i>	
PARASITIC AFFECTIONS OF THE MOUTH	160
<i>CHAPTER XIX.</i>	
DISEASES OF THE TONGUE	164

	PAGE
<i>CHAPTER XX.</i>	
DISEASES OF THE GUMS 	178
<i>CHAPTER XXI.</i>	
DISEASES OF THE FLOOR OF THE MOUTH ...	181
<i>CHAPTER XXII.</i>	
DISEASES OF THE LIPS AND CHEEKS 	186
<i>CHAPTER XXIII.</i>	
DEFORMITIES OF THE MOUTH 	193
<i>CHAPTER XXIV.</i>	
FOREIGN BODIES IN THE UPPER AIR AND FOOD PASSAGES	204
<i>CHAPTER XXV.</i>	
OPERATIONS ON THE UPPER AIR AND FOOD PASSAGES	210
<i>CHAPTER XXVI.</i>	
DISEASES OF THE SALIVARY GLANDS 	217

LIST OF ILLUSTRATIONS.

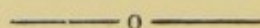


FIG.	PAGE
1. Mandible showing seats of Fracture	2
2. The four-tailed Bandage	5
3. Gutta-percha Splint	6
4. Model of Fracture of Mandible (<i>Newland Pedley</i>)...	7
5. Hammond Splint applied on the corrected Model ...	7
6. Hammond's Splint	8
7. Hayward's Splint	9
8. Gunning's Splint	10
9. Acland's Splint	11
10. Dissection of Dislocation of Mandible (<i>Heath</i>) ...	16
11. Dislocation of Mandible (<i>Fergusson</i>)	18
12. Phagedenic Periodontitis (<i>Amer. Syst. Dentistry</i>) ...	27
13. do. do.	29
14. Alveolar Abscess	32
15. Do. do.	33
16. Chronic Fistulous Alveolar Abscess do.	37

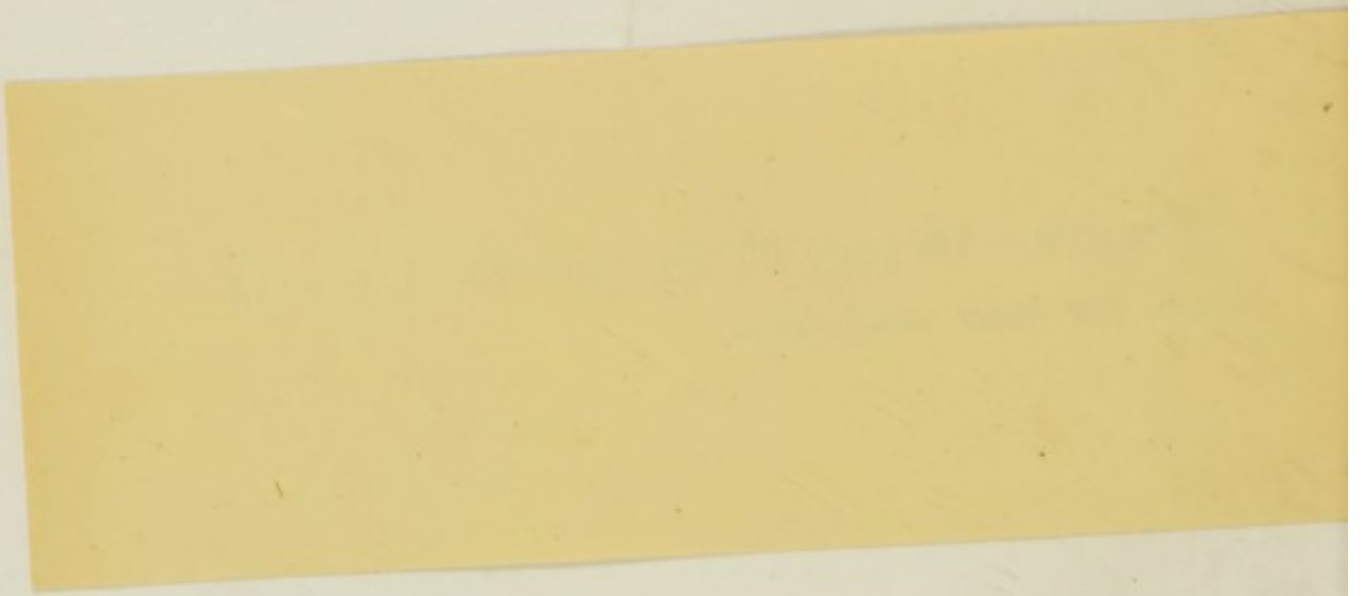
LIST OF ILLUSTRATIONS.

ix

FIG.		PAGE
17.	Chronic Alveolar Abscess	38
18.	Alveolar Abscess involving Antrum (<i>Amer.Syst.Dent.</i>)	39
19.	Operation for freeing depressed Scar do.	40
20.	Necrosis of Alveolus	48
21.	Necrosis after Small Pox	53
22.	Stevenson's Oral Lamp	59
23.	Antrum Perforator	61
24.	Heath's Antral Syringe	61
25.	Empyema of Antrum with blocked ostium ...	65
26.	Epithelial Odontome	70
27.	Do. Microscopic Section	71
28.	Radicular Odontome (<i>Salter</i>)	76
29.	do, do.	76
30.	Cementome (<i>Forget</i>)	77
31.	Fibrous Odontome (<i>Bland Sutton</i>)	78
32.	Follicular Odontome	79
33.	Composite Odontome (<i>Forget</i>)	82
34.	Fibrous Epulis (<i>Heath</i>)	85
35.	Epithelioma of Gum	88
36.	Excision of Maxilla (<i>Heath</i>)	107
37.	Fergusson's Saw	108
38.	Narrow-bladed Saw	108
39.	Excision of Maxilla (<i>Heath</i>)	109
40.	do. do.	110
41.	Lion Forceps	110
42.	Ivory Exostosis of Mandible	117
43.	Sarcoma of a Tooth Follicle (<i>Bland Sutton</i>) ...	118
44.	Epithelioma of Mandible	120

FIG.					PAGE
45.	Excision of Mandible	(Heath)	...	...	123
46.	do.	(Erichsen)	...	...	124
47.	do.	do.	...	...	124
48.	Leontiasis Ossea	...	...	...	127
49.	Acromegaly		(Partsch)	...	129
50.	Cast of Jaws from case of Acromegaly	do.	...	...	130
51.	Acromegaly	...	...	do.	130
52.	Actinomycosis	...	...	...	134
53.	Actinomyces	(rays and clubs)	...	...	135
54.	Actinomyces	(Myceleal form)	...	...	135
55.	Ranula	...	...	...	182
56.	Epithelioma of lip	...	...	...	190
57.	Development of mouth	(His.)	...	...	194
58.	Partial single Hare-lip	...	...	...	195
59.	Single Hare-lip extending into nostril	...	...	...	195
60.	Partial double Hare-lip	...	...	...	196
61.	Double Hare-lip	...	...	...	197
62.	Operation for Hare-lip	...	...	...	197
63.	Cleft Palate	...	...	...	200
64.	do.	...	...	...	200
65.	do.	...	...	...	201
66.	Tracheotomy	...	...	...	213
67.	Tracheal Dilators...	...	...	...	214
68.	Tracheotomy Tube	...	...	...	214

ERRATUM.—On page 59, six lines from bottom of page, for *outer* read *inner*.



ORAL SURGERY.

FRACTURE OF THE MANDIBLE.

Causes. Fracture of the mandible is nearly always the result of considerable direct violence, such as the kick of a horse, a fall from a height, a blow from a fist, etc. Small pieces of the alveolus are often unavoidably broken in extracting teeth, but a complete fracture may occur during extraction by unskilled persons. It is said that fracture has resulted from muscular action, but such an occurrence must be extremely rare.

Varieties. Most fractures of the mandible are compound, because the muco-periosteum covering the bone is torn, thus admitting air from the mouth; when the fracture occurs in a part of the bone not in direct relation with the buccal cavity it is usually simple, unless it results from a penetrating wound or gunshot injury. The fracture may be single, multiple or comminuted.

Situation. The line of fracture may pass through the socket of the canine tooth, the mental foramen, the symphysis,

the angle, the ramus, the neck of the condyle or the coronoid process. The commonest situations are the socket of the canine tooth and the mental foramen. (Fig. 1.)

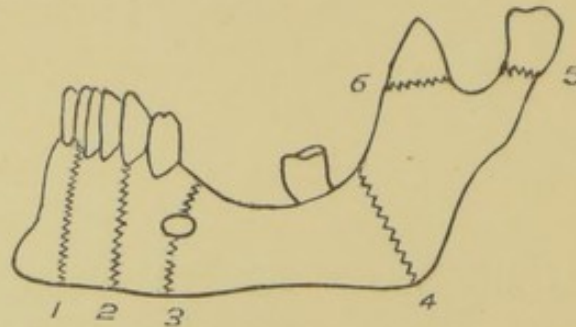


Fig. 1.—VARIOUS SITES OF FRACTURE.

1. At Symphysis. 2. Through Socket of Canine Tooth. 3. Through mental Foramen. 4. At the Angle. 5. Through neck of Condyle. 6. Through Coronoid process.

Symptoms. The symptoms of fracture of the mandible are pain, deformity, preternatural mobility, crepitus, loss of function, bleeding from the gums and dribbling of saliva. The pain is usually severe, more so than in most fractures; its severity is due partly to the laceration of the gum and partly to injury to the mandibular nerve; it is increased on masticating, swallowing or speaking, and causes the patient to support the injured part with his hands.

The deformity is only noticeable on looking inside the mouth; it is due to displacement of the fragments. The smaller or posterior fragment is usually displaced outwards and a little forwards overlapping the larger or anterior fragment; the displacement is due partly to the direction of the line of fracture which runs as a rule from the inner plate forwards and outwards to the outer plate. When the

body of the jaw is fractured on both sides, the displacement is more marked, the loose central fragment being drawn downwards and backwards by the muscles passing to the hyoid bone. When the fracture is in the ramus there is very little displacement and it does not of course affect the regularity of the teeth. In fracture of the neck of the condyle, the latter is drawn forwards by the external pterygoid muscle and can be felt by the finger introduced into the mouth; the chin is slightly tilted towards the injured side, (the reverse occurs in unilateral dislocation).

Preternatural mobility is more apparent the nearer the fracture is to the middle line ; it can be both seen and felt ; it is most marked when the fracture is double.

Crepitus can be detected when the fragments are moved on each other, or by placing the hand over the injured part while the patient opens and closes the mouth. It is of most value as a symptom when the fracture is situated in the ramus or the neck of the condyle, because in these cases the other symptoms are more obscure.

Loss of function is evidenced by inability to masticate, and by impaired speech.

Complications. Fracture of the mandible is usually a comparatively trifling injury and is soon repaired, but it may be complicated by the following conditions.

(a) *Hæmorrhage.* This is usually slight and derived from the injured gum, but severe bleeding (both primary and secondary) has been known to occur from injury to the inferior dental artery.

(b) *Wounds of the face* are rare except in gunshot injuries.

(c) *Dislocation of the mandible* is extremely rare in cases of fracture.

(d) *Injury to the teeth.* One or more teeth in the vicinity of the fracture are occasionally broken or a tooth may be dislocated from its socket and interposed between the broken ends of the bone interfering with the process of union.

(e) *Damage to the mandibular nerve* may occur at the time of the accident, or subsequently from the pressure of callus, causing anæsthesia or neuralgia in the region supplied by the nerve.

(f) *Injury to the base of the skull.* The condyle has been known to be driven through the glenoid cavity and inflict fatal injury to the brain.

(g) *Necrosis* may result from complete separation of a fragment from its vascular connections at the time of the injury or subsequently as the result of suppuration.

(h) *Salivary fistula* may result from imperfect healing of an abscess which has burst upon the surface of the cheek.

(i) *Vicious union*, i.e., union with deformity, may occur when the fragments have not been kept in proper apposition, especially in multiple fractures, or where there has been loss of bone from necrosis.

(j) *Non-union* may be due to want of apposition through lack of treatment, or through the interposition of a loose or necrosed fragment or a dislocated tooth.

(k) *False joint.* In this condition the ununited fragments become rounded off at the ends and held together by a sort of fibrous capsule lined by a smooth membrane which secretes a kind of synovial fluid. In Esmarch's operation for closure of the jaws, the surgeon aims at producing this condition.

TREATMENT.

The following are the methods most frequently used.

(1) *The four-tailed Bandage.* A piece of bandage a yard long and 4 inches wide, with a hole 2 inches long in the middle of it, and with the ends split to within four inches of the hole, is applied so that the point of the chin is received into the hole. (Fig. 2.) The hole should be about an inch nearer the



Fig. 2.—THE FOUR-TAILED BANDAGE APPLIED.

upper than the lower edge of the bandage, so that the latter may lift the jaw rather than tend to drag it backwards. The two lower tails are tied over the top of the head, and the two upper ones behind the occiput, the two portions being subsequently knotted together to prevent their slipping. If the upper tails are tied behind the nape of the neck (as recom-

mended by some surgeons) they have a tendency to draw the anterior fragment backwards.

Some surgeons supplement the four-tailed bandage with a moulded gutta-percha splint. (Fig. 3.) In most cases it is

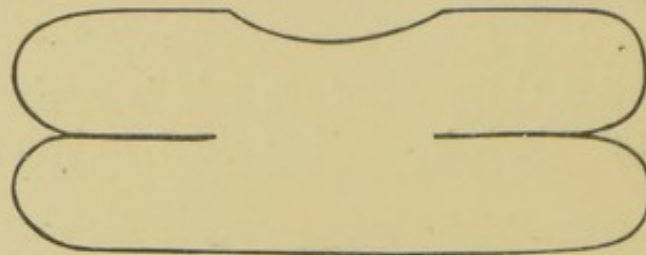


Fig. 3.—GUTTA PERCHA SPLINT BEFORE MOULDING.

unnecessary and adds to the discomfort of the patient by retaining the perspiration, by becoming soaked with saliva and by pressing upon the soft tissues of the chin. If used, it should be perforated with small holes and lined with chamois leather or lint, and the parts dusted over with an absorbent antiseptic powder.

The objections to the use of the four-tailed bandage are, (*a*) when there is much displacement, especially in oblique fractures, the bandage does not remedy it; and (*b*) the jaws being kept in apposition, mastication is impossible and the patient is limited to fluid nourishment.

(2). *The Hammond Splint.* This consists of a wire frame which is accurately fitted and fixed to the teeth. The splint is fitted in the first instance on a model of the jaw. To obtain the model, the fracture is fixed temporarily by a silk ligature passed round two teeth on each side of the fracture, and an impression of both upper and lower jaws taken in wax. When the models have been cast, the lower one must be sawn through

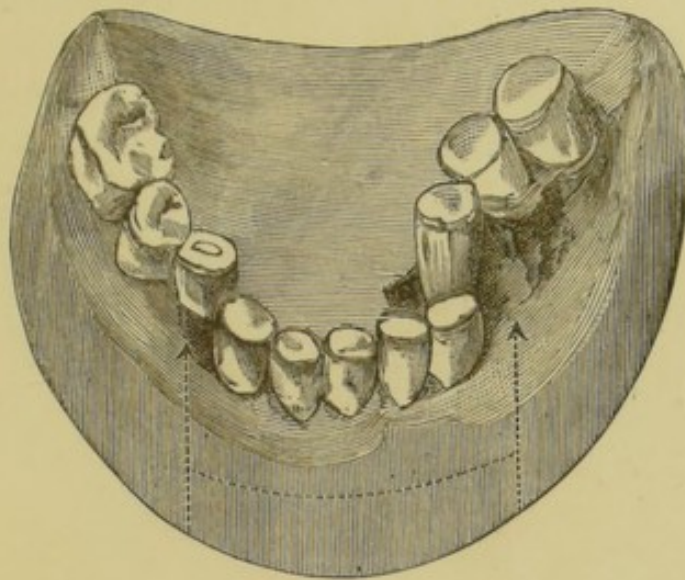


Fig. 4.—MODEL OF FRACTURE OF MANDIBLE.

The dotted lines show the position of the saw-cuts necessary to remedy the displacement. (Newland-Pedley.)

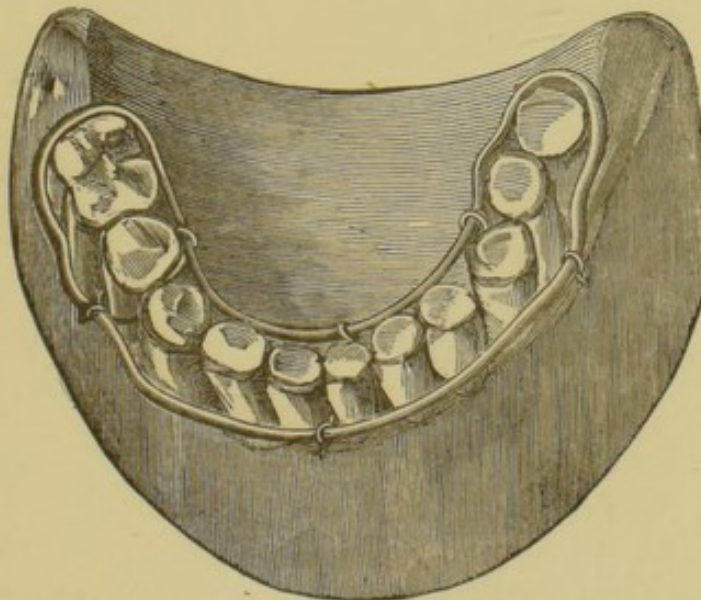


Fig. 5.—HAMMOND SPLINT APPLIED ON THE CORRECTED MODEL. (Newland-Pedley.)

at the line of fracture, (Fig. 4), and the pieces fixed together so that the upper and lower teeth articulate correctly. In this way is obtained a model of the same size and shape as the jaw before it was broken. To this model a frame of soft iron wire is accurately moulded, the ends being soldered together (Fig. 5). The splint thus constructed is next slipped over the patient's teeth (which should be free from tartar) and fixed in position by means of a number of pieces of iron binding wire about five inches long and pointed at the ends to facilitate their passage between the teeth. The first wire is

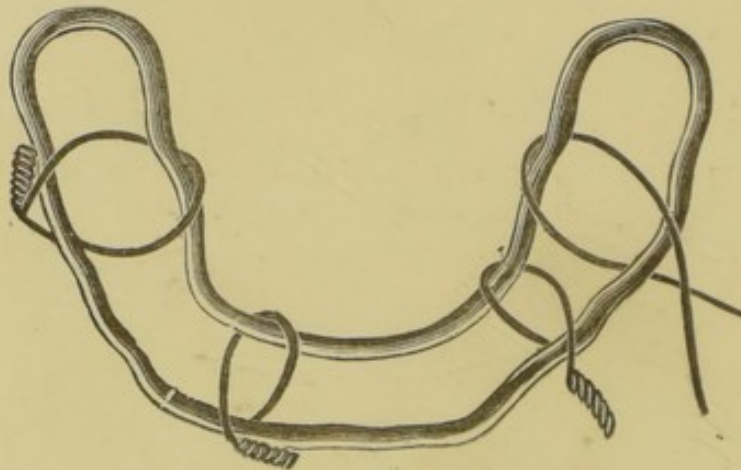


Fig. 6.—HAMMOND'S SPLINT.

Showing the method of passing the Binding Wires.

passed over the outer bar of the splint, between the first and second molar teeth of the left side and below the inner bar ; it is then bent round being made to return over the inner bar, between the first molar and second bicuspid and under the outer limb ; the two ends are then loosely twisted together. (Fig. 6). The same process is repeated on the right side of the mouth. The wiring is repeated on alternate teeth, until the splint has a firm hold ; it is not necessary to wire every

tooth, and it is inadvisable to wire those in the immediate vicinity of the fracture. When all the wires have been passed the ends are twisted up, cut short, and tucked away under the outer bar of the splint. After a few days they will probably want tightening up a little more. The advantages of the Hammond splint are (a) the fracture is brought into accurate apposition so that the "bite" is restored. (b) It is very firmly fixed. (c) Mastication and speech are very little interfered with. (d) The mouth can be kept clean. (e) The apparatus is out of sight. Unfortunately its applicability is limited to those cases in which there are a sufficient

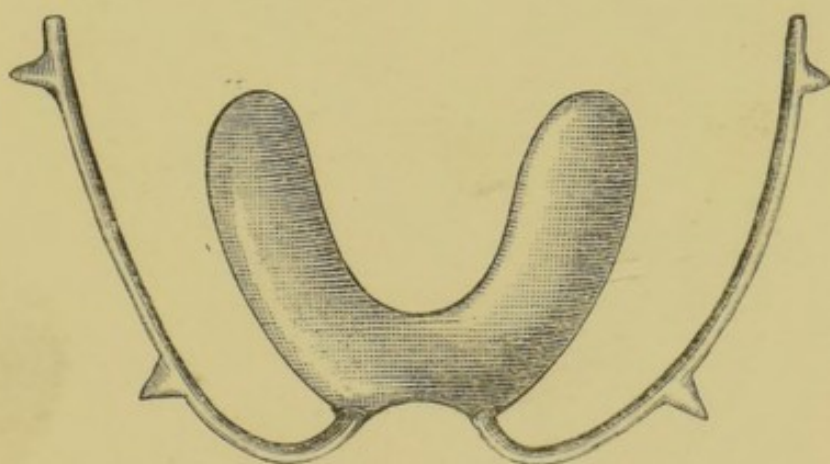


Fig. 7.—HAYWARD'S SPLINT.

number of firm sound teeth on each side of the fracture to enable it to obtain a firm hold.

(3). *The Hayward (or Kingsley) Splint.* This consists of a metal or vulcanite cap which fits over the teeth. In the sides of the cap are fixed two wires an eighth of an inch thick; the wires are curved so that, when the apparatus is applied, they emerge from the angles of the mouth and lie

over the cheek. (Fig. 7). The splint is fixed by means of a bandage passing under the jaw between the two wires. Its chief disadvantage is that the projecting wires prevent the patient from sleeping on the side.

(4). *The Gunning Splint.* This is a vulcanite splint which has depressions to receive the teeth of both the upper and the lower jaws. (Fig. 8). When applied, the jaws are bound together by a four-tailed bandage. The disadvantages of this splint are (a) suspension of mastication, (b) dribbling

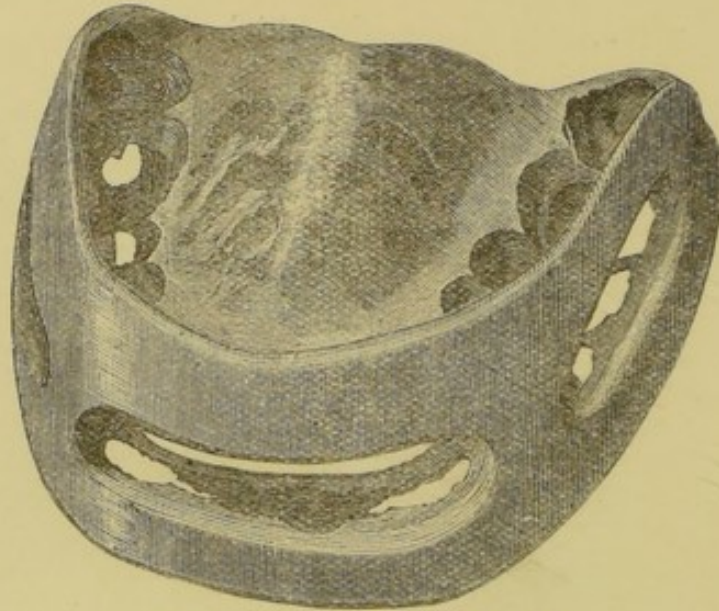


Fig. 8.—GUNNING'S SPLINT.

of saliva (c) fatigue from propping the jaws open (d) difficulty in keeping the mouth clean.

(5) *Ackland's Splint.* This consists of a plated metal horse-shoe shaped piece which rests on the lower teeth, and a similar one which is applied below the chin. These are fastened together by two movable clamps. (Fig. 9). To apply the splint the mouth plate is lined with gutta-percha which is

warmed and driven down on the teeth and gums. The chin-plate, lined with wash leather, is put in position and held there. The swivel clamps are then fitted into both plates and by the thumbscrew can be made to clamp the plates together until the requisite tension is attained. The advantages claimed for this apparatus are (a) it can be quickly and readily applied (b) it can be used over and over again for different patients

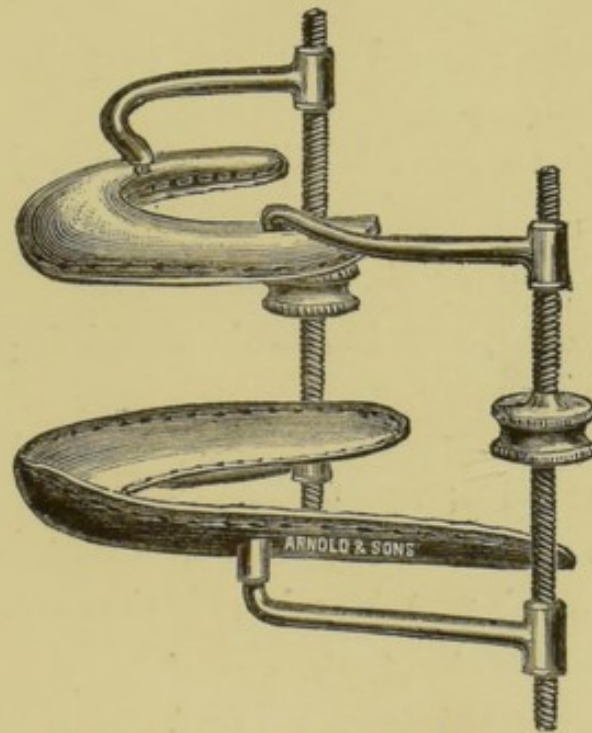


Fig. 9.—ACKLAND'S SPLINT.

(c) the mouth and splint are easily kept clean (d) it does not interfere with the function of the jaw (e) it can be used in edentulous cases. The chief disadvantage of any splint having a chin piece is that the pressure of the latter is apt to produce pain and to lead to ulceration or sloughing.

(6). *Ligaturing the Teeth.* This procedure loosens the teeth and irritates the gums. It should only be used to fix

the fracture temporarily until a permanent apparatus can be applied.

(7). *Wiring the Fragments.* This is scarcely ever required for an ordinary fracture, but may be used with advantage when the surgeon has to divide the jaw in performing Syme's operation for removal of the tongue.

ON THE CHOICE OF A METHOD.

The practitioner must determine in each case what will be the most suitable method of treatment.

The following statement will cover the majority of cases met with :—

1. *Fracture of the Body.*

(a) In an adult, with firm teeth in each fragment—Hammond's splint.

(b) In a child—Hayward's splint, the cap being made of vulcanite and lined with gutta percha moulded on the teeth.

(c) When there are not enough firm teeth to fix a Hammond, a Gunning's or Ackland's splint should be used.

2. *Fracture of the Angle, ascending ramus, condyle or coronoid process—four-tailed bandage.*

Whatever method is used it will generally be necessary to keep the retentive apparatus on for about five weeks. At the end of that period splints and bandages may be discarded, but it is well for the patient to wear a handkerchief tied round the chin and over the top of the head for some few weeks especially at night so as to check any unduly violent movement of the jaw.

FRACTURE OF THE MAXILLA.

Causes. As in the case of the mandible, the most common cause of fracture of the maxilla is a severe injury, such as a kick or a violent blow on the face. In military practice it is often the result of gunshot injuries. Fracture of the alveolus, or of the tuberosity, may occur during the extraction of teeth; it was of more frequent occurrence in former days, when "the key" was in common use.

Varieties. These fractures vary very much in extent; they may be mere fissures with no appreciable displacement, or small splinters may be chipped off, or a portion of the alveolus with its contained teeth may be separated, or the whole bone may be extensively comminuted. It should be borne in mind that fracture of the maxilla may be but part of a much more serious injury, such as fracture of the skull. Fractures of the maxilla are practically always compound, the muco-periosteal covering of the bone being torn and admitting air from the mouth or from the antrum.

Symptoms. When the fracture is only a fissure in the bone, it may very readily be overlooked, but the mistake is not of much importance, as good union will ensue without special treatment. When displacement has occurred the nature of the injury is sufficiently obvious on inspection.

Complications. (a) Hæmorrhage is more common and more severe in fractures of the maxilla than in those of the mandible, on account of the much greater vascular supply of the former.

(b) The teeth may be fractured or dislocated.

(c) The nasal duct may be torn across or compressed,

leading to emphysema of the face, and obstruction to the flow of tears into the nose.

(*d*) The line of fracture may involve the antrum, and lead to suppuration in that cavity. Sometimes foreign bodies or dislocated teeth may lodge in the antrum, and remain there a long time, even for years.

(*e*) The infra-orbital nerve may be damaged causing anæsthesia or neuralgic pain.

Treatment. The following indications demand attention.

(*a*) To arrest bleeding by tying any vessel that can be seen, by injecting cold water, or by the use of styptics or the actual cautery when other means fail.

(*b*) Not to remove any fragments or loose teeth unless they are quite detached; the parts are so vascular that fragments which seem sure to necrose, frequently unite perfectly. Should necrosis occur it is easy to remove the sequestrum at any subsequent time.

(*c*) Any displaced fragments must be restored to their normal position as far as possible.

(*d*) If the fragments will not remain in position of their own accord, they must be fixed by means of some form of splint such as a gold plate or a modified Hammond's or Gunning's splint.

(*e*) The mouth must be kept as aseptic as possible by syringing with boracic lotion or Condy's fluid, and dusting the parts over with a powder composed of equal parts of iodoform, creolin and boracic acid.

CHAPTER II.

DISLOCATION OF THE MANDIBLE.

Dislocation of the mandible may be bilateral or unilateral, the former being the more common in the proportion of about 3 to 2. It is more common in middle-aged, than in very young or very old people. This is due partly to the greater exposure of persons of middle age to injury, and partly to the ramus being more nearly at a right angle with the body of the bone, than it is at the extremes of life.

Causes. Dislocation can only occur when the mouth is opened widely. In this position the condyle advances upon the eminentia articularis, and may be precipitated over it by *muscular action* or by *external violence*. The external pterygoid is the muscle which pulls the condyle over the eminence when the mouth is wide open. This may occur during vomiting, yawning, laughing, shouting, etc. The violence which produces a dislocation may act from without as a blow, or from within, as by forcing large objects into the mouth, by taking a model or by extracting teeth without supporting the jaw from outside. Probably in all cases the action of the external pterygoid muscle is an essential factor.

Pathology. When the parts are dissected the following conditions are found :

The condyles are in front of the eminentia articularis ; the inter-articular cartilages remain attached to the condyles ; the capsular ligament is stretched, but rarely torn ; the external lateral ligament is tense, and its natural obliquity reversed, so that it slants from behind forwards instead of from before backwards, the internal lateral and stylo-mandibular ligaments are stretched ; the coronoid processes

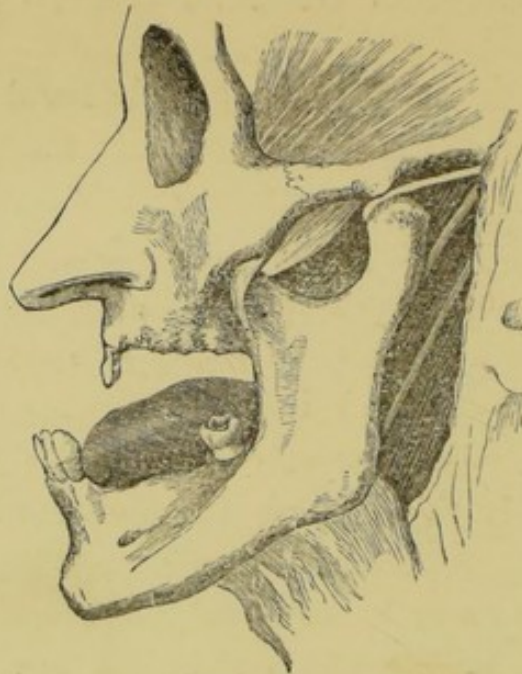


Fig. 10.—DISSECTION OF DISLOCATION OF MANDIBLE.
(C. Heath.)

are surrounded by the temporal muscles, and are well below the lower margin of the malar bone when the mouth is wide open. If an attempt be made to close the mouth without reducing the dislocation, the internal lateral and stylo-mandibular ligaments are rendered still more tense, and the coronoid process impinges on the lower margin of the malar bone, only some fibres of temporal muscle being interposed.

Mr. Christopher Heath denies that the fixity of the dislocated mandible is in any measure due to contact with the malar bone, and in support of his view, he gives in his well-known book an illustration prepared from a dissection of a dislocation artificially produced on the dead body. In this drawing (Fig. 10), which I am permitted to reproduce, it will be seen that although the condyle is not in front of the eminentia articularis, yet the top of the coronoid process is very near the lower edge of the malar bone and would actually impinge upon it if an attempt were made to close the mouth. He also says "were the coronoid processes fixed against the malar bones, it would be impracticable to effect a reduction by elevating the chin." With the greatest deference to so distinguished an authority, I venture to question the truth of this statement. In reducing the dislocation by raising the chin the coronoid process rests against the malar bone as on a fulcrum; as the chin is raised so the condyle is depressed, and made to retrace its steps as far as the summit of the eminentia articularis; from this position of unstable equilibrium but slight force is necessary to send it back into the glenoid cavity. Reduction in this manner would not be possible if the coronoid processes became hooked in front of the malar prominences, but such a relation of parts is prevented by the strong tendinous insertion of the temporal muscle.

The gradual increase in movement noticed in old-standing cases of dislocation is no doubt due partly to absorption of the coronoid processes from pressure, and partly to stretching of the involved ligaments.

Symptoms. When the dislocation is bilateral, the mouth is wide open and the jaw fixed, the lower teeth being in advance

of the upper (Fig. 11); there is a marked hollow immediately in front of the ear ; the condyle can be felt in front of the hollow just mentioned, and the coronoid process can be felt behind and below the malar bone ; there is sometimes a prominence immediately above the zygoma formed by the



Fig. 11.—DISLOCATION OF MANDIBLE. (Fergusson.)

abnormal condition of the temporal muscle ; it is not certain whether this condition is due to stretching of the muscle, or to spasmodic contraction. The masseters are firmly contracted and stand out in relief. There may be considerable pain from pressure on sensory branches of the fifth nerve, but sometimes no pain is complained of. The lips cannot be approximated, and consequently there is dribbling of saliva, and impairment of speech, the labial consonants being unpronounceable.

In cases of unilateral dislocation the symptoms are less pronounced and may be overlooked ; the mouth is not so widely open nor so fixed ; the chin is displaced towards the *sound* side, but this deformity may not be obvious until reduction of the dislocation has displayed the natural contour of the face. The deformity directly due to displacement of the condyle and coronoid process is only to be detected on the injured side.

Treatment. Sometimes the patient is able to effect reduction for himself, but in the majority of cases surgical aid is required. The following methods of reduction may be employed :—

(a) The simplest plan is to place the patient in a chair with his head resting firmly on a support. The surgeon standing in front of the patient, having protected his thumbs with a towel, introduces them into the mouth and presses them as far back as possible on the molar teeth at the same time grasping the jaw with his fingers. Pressure is now made downwards and backwards so as to free the condyles from the eminentia articularis ; the chin is then elevated and the condyles slip back into place. In this method of reduction, the jaw is used as a lever, the fulcrum being furnished by the operator's thumbs.

(b) Wedges of cork placed between the molar teeth may be substituted for the thumbs, and pressure made on the chin by the hand, or by a screw tourniquet passed round the head and beneath the chin. In difficult cases it will be found easier to reduce one condyle at a time, but care must be taken in reducing the second one not to re-dislocate the first.

(c) One end of a piece of wood about a foot long may be

introduced between the molar teeth ; by raising the other end the lower molars are depressed, the upper teeth serving as the fulcrum ; the jaw is thus levered back into place, one condyle being replaced at a time.

(d) Stromeyers forceps. These are introduced between the molar teeth of the upper and lower jaws, by closing the handles the blades are separated, the lower jaw depressed, and the condyle disengaged from the eminentia articularis ; the chin is then pressed upwards and backwards.

(e) Nelaton's method. The coronoid processes are forced backwards by the thumb introduced into the mouth.

In cases where any difficulty is experienced in effecting reduction, the administration of an anæsthetic will be of great assistance. After reduction has been accomplished the jaw should be fixed with a four-tailed bandage for a week or ten days. If this precaution is neglected, the dislocation is apt to recur on the patient opening his mouth.

Old-standing Dislocations. It sometimes happens that a dislocation is overlooked, or remains untreated ; in such cases the patient slowly regains a certain amount of movement, being able perhaps after several weeks to approximate the lower incisor teeth to within an inch of those of the upper jaw, but never sufficiently near for purposes of mastication. He may however be able to approximate his lips so as to regain the power of articulating labial consonants and of retaining his saliva. In all such cases an attempt at reduction should be made, for even if they are not attended with success, they result in considerable increase of mobility from the breaking down of adhesions. The longest period after which reduction has been accomplished is said to be ten months.

Recurring Dislocations. In some cases the ligamentous structures have been so stretched at the time of the accident, or through want of subsequent rest, have so far failed to repair, that they permit the dislocation to recur at frequent intervals. In these cases reduction is usually easy ; the difficulty is to effect a permanent cure. This may be brought about by keeping the jaw fixed for a considerable period. Should this method fail after a fair trial, it would be advisable to cut down upon the temporo-maxillary joint and suture the inter-articular cartilage to the periosteal attachment of the capsule to the zygoma.

Congenital Dislocation of the mandible is a rare condition due to malformation of the articulation. It is not amenable to surgical treatment.

Subluxation of the mandible is believed by Professor Annandale to be due to slipping of the fibro-cartilage through laxity of the capsule. Mr. Heath attributes the condition to rheumatic or gouty affections of the joint.

CHAPTER III.
—PERIOSTITIS OF THE JAWS.
—

The periosteum of the jaws in addition to covering the surfaces of the bones, affords a lining to the sockets of the teeth known as the periodontium, pericementum, or alveolo-dental membrane. It is convenient to limit the term *periostitis* to inflammation of the periosteum covering the surface of the bones, and to apply the terms *periodontitis*, or *pericementitis* to inflammation of the alveolo-dental membrane.

PERIOSTITIS.

Varieties. Periostitis may be *acute* or *chronic*; *circumscribed* or *diffuse*; *osteoplastic* or *suppurative*; it may also be due to a number of different causes.

Causes. These may be divided into local and general.

The local causes are injury such as blows, wounds and fractures, and extension of inflammation from the adjacent bone, (as in alveolar abscess), or mucous membrane (as in ulcerative stomatitis).

The general causes include syphilis, struma, gout, rheuma-

tism, certain exanthematous fevers, such as scarlatina, measles and variola, and the excessive use of certain drugs, especially mercury.

Pathology. The pathological changes are simply those of inflammation ; the outer fibrous layer swells and becomes redder than natural, whilst the cells of the osteogenetic layer proliferate and loosen the attachment of the membrane to the bone. The inflammation may terminate in *resolution*, or may go on to the formation of an *abscess* between the periosteum and the bone. Suppuration most often occurs in acute periostitis, especially when of septic origin, but it may also follow chronic periostitis in persons whose health is undermined by syphilis or tuberculosis. Periosteal suppuration often leads to *necrosis*. Chronic periostitis in an otherwise healthy person, usually leads to the deposit of new bone in the shape of a *node*.

Symptoms. In the majority of cases of *acute periostitis*, the symptoms will have been preceded by those of periodontitis in connection with a decayed tooth which has started the mischief. When the inflammation has reached the surface periosteum, considerable swelling of the gum ensues accompanied by very severe pain. The swelling is at first hard to the touch, and extremely tender, but soon softens in its centre from the formation of pus ; the face becomes swollen and red. The local condition is usually accompanied by general febrile symptoms, the temperature is raised, the tongue furred, the appetite lost, the bowels confined, etc. The subsequent symptoms will depend upon the course of the disease ; if resolution occur, the local and general symptoms gradually subside, but if on the other hand the inflammation go on to

suppuration or necrosis, a further train of symptoms ensues, which will be presently described.

In *chronic periostitis* there are usually no febrile symptoms and the local signs are limited to the formation of an indolent swelling on the surface of the jaw, which usually causes more or less aching pain, worse at night. Chronic periostitis is most often syphilitic in origin, but may be due to any of the causes mentioned above. In diagnosing a case of periostitis of the jaws, it is necessary to discover the cause as well as the nature of the affection; with this object the history of the case should be carefully gone into, and signs of disease in other parts of the body looked for.

Treatment. The first thing to do is to remove the cause of the disease when this is possible; this having been done, means must be adopted to allay the inflammation and to prevent it leading to suppuration and necrosis.

In most acute cases the cause will be found in a carious tooth; the surgeon must then determine whether the offending tooth is to be extracted, or whether it can be rendered innocuous by appropriate means. This is a point upon which the opinions of the dentist and of the general surgeon do not always coincide, the former sometimes endeavouring to save a tooth which had better be extracted, whilst the latter as often (perhaps more often) errs in the opposite direction, therefore it is desirable that a consultation should be held when possible. The most efficient way of allaying the local inflammation and preventing its evil effects is to make a free incision through the inflamed part right down to the bone. When the swelling is acute and of any considerable amount, this should always be done whether pus has formed or not, the relief of tension and the local blood-letting thus obtained

have the most beneficial effects. The incision should be followed by the use of a warm antiseptic mouth wash. A saline aperient followed by a tonic is usually required. In chronic periostitis the cause is more often a constitutional one, such as syphilis, and therefore more benefit accrues from appropriate constitutional treatment than from local remedies, yet it is important in every case to see if there is any source of local irritation.

PERIODONTITIS.

Periodontitis may be *local* or *general*—*i.e.*, it may affect one socket or many ; either variety may be *acute* or *chronic*.

Acute local periodontitis is usually due to the escape of septic matter (bacteria) from the pulp through the apical foramen, setting up acute inflammation in the tissues occupying the apical space. The inflammation usually goes on to suppuration (see Alveolar Abscess), but may become chronic or may undergo resolution ; it may remain localised to the dental periosteum, or may extend to the bone and to the surface periosteum producing conditions already described.

Symptoms.—The affected tooth is slightly raised in the mouth and feels uneasy, but at first the uneasiness is relieved by biting ; soon the surrounding gum becomes red, swollen, and tender and the uneasy sensation is replaced by actual pain, which is of a constant gnawing character and is no longer relieved by biting ; if suppuration occurs the swelling increases, and the pain becomes throbbing in character, and the abscess thus formed points (see Alveolar Abscess).

Treatment.—The offending tooth must be removed, or dealt with according to approved dental methods as occasion

may require. A free incision should be made over the swelling, and the mouth repeatedly rinsed with a warm antiseptic wash. In slight cases where there appears to be no risk of suppuration, the gum may be painted over with a mixture of equal parts of liniment of iodine, tincture of aconite and chloroform. The bowels should be freely moved by a saline aperient and a tonic (preferably quinine) prescribed.

Chronic local periodontitis may follow the subsidence of an acute attack, or may be chronic from the first. It is usually caused by some morbid or abnormal condition of the tooth, but it is predisposed to by struma, syphilis, rheumatism, &c. The chief *symptoms* are looseness of the tooth, tenderness on percussion, and a dull, gnawing pain. The *treatment* consists in attending to the general health, and in dealing with the morbid condition of the offending tooth.

Acute general periodontitis is usually associated with periostitis of the surface of the jaw ; it may be due to injury (especially septic wounds), to the effects of mercury or phosphorus, to blood dyscrasæ, such as syphilis, struma, and rheumatism, or it may follow upon scarlet fever, or other exanthemata. It is very apt to produce necrosis (which see).

Chronic general periodontitis is usually of the suppurative variety leading to exudation of pus around the necks of the teeth, a symptom known as *pyorrhœa alveolaris*. Many authorities regard pyorrhœa as a disease, but it is in reality only a symptom. There are two varieties of chronic general periodontitis, and they both cause pyorrhœa.

(a) *Calcic periodontitis* is due to the irritation of calculus deposit on the teeth ; the calculus may be derived from the

saliva (*salivary*), or from serum exuding from an inflamed gum (*serumal*). Salivary calculus is found most abundantly in the neighbourhood of the openings of the salivary ducts—viz., on the lingual aspects of the lower incisors, and on the buccal surface of the upper molars, but may spread to other parts ; it acts as an irritant leading to inflammation and gradual destruction of the gum, the peridental membrane and even the alveolar wall ; in this way the teeth gradually

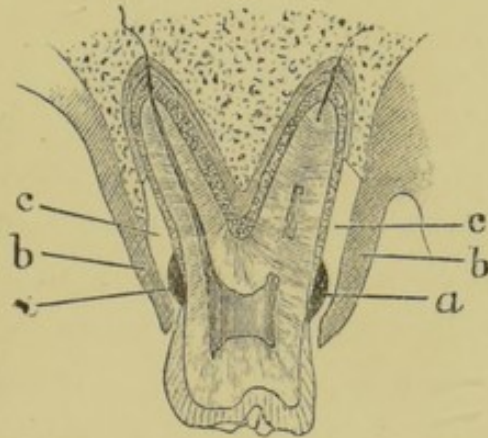


Fig. 12.—Section of upper molar, showing destruction of Peridental membrane and alveolar wall in Phagedenic periodontitis, *a.* serumal calculus, *b.* gum separated from tooth, *c.* pus cavity formed by destruction of peridental membrane and alveolar wall. (From the *American System of Dentistry*.)

loosen and fall out. Serumal calculus is found most frequently on the necks of the teeth, hidden under the margin of the gum (Fig. 12), its distribution not bearing any relation to the openings of the salivary ducts ; it is generally in the form of little nodules, or a hard crust of brownish colour firmly adhering to the tooth ; it is very irritating and produces chronic inflammation and destruction of the peridental membrane. As the peridental membrane is detached and

destroyed, the alveolar wall is slowly absorbed, and the gum recedes, exposing the calculus to view, but the destruction of gum tissue is not so marked as in the case of salivary calculus. With both kinds of deposit the gum is apt to be spongy and to bleed readily, and pus exudes on pressure being made with the finger. The treatment of calcic periodontitis consists in extracting those teeth which are hopelessly loosened, and in removing the calculus from those which can be saved. (For the details necessary to carry out the treatment a work on Dental Surgery should be consulted.)

(b) *Phagedenic periodontitis* differs from the calcic variety more in its cause and mode of progress, than in its ultimate result; whereas in the calcic variety the destruction seems to be due to the irritation of the deposit, in the phagedenic variety the destructive inflammation seems to depend chiefly on the action of micro-organisms. The mouth always contains myriads of bacteria many varieties of which are capable of setting up destructive inflammation in any tissue of lowered vitality, but as far as is known, there is no specific micro-organism for phagedenic periodontitis. Some authors have assigned a large share in the etiology of this disease to gout, but apparently without sufficient reason.

Although the same parts are destroyed in the calcic as in the phagedenic variety of this disease there is an important difference in the extent and mode of progress of the destruction, for whereas in the former disease the destruction of tissue is co-extensive with the deposit of calculus, in the latter the peridental membrane is the part primarily affected, and its destruction takes place in an irregular manner so that deep sinuous pockets are formed which may extend right up to the

apex of the root (Fig 13). Many cases are complicated by calcic deposit but in them the pockets extend far beyond the line of deposit; in some cases there is no calculus present. The absorption of the alveolar margin follows very closely, and seems to be dependent upon the destruction of the periodontal membrane; where absorption is taking place the margin of the socket is often everted and thickened. Ultimately the tooth becomes completely loosened from its attachments and drops out, the alveolus disappears and the disease reaches its natural termination. The disease is undoubtedly infectious in that neighbouring teeth become affected, but whether it can be conveyed from one person to another is not yet definitely determined.

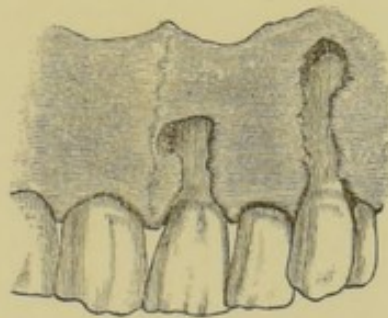


Fig. 13.—PHAGEDENIC PERIODONTITIS.

The soft tissues have been reflected, showing the extensive destruction of the periodontal membrane and alveolar wall. (From the *American System of Dentistry*.)

Treatment.—All trace of calculus should be very carefully removed. The pockets should be syringed out daily with a solution of perchloride of mercury in peroxide of hydrogen of the strength of 1 grain to the ounce; when the pockets are deep and sinuous they may be opened up by an incision

through the gum. When the alveolar margin is much thickened or everted, it may with advantage be cut away with a chisel. Teeth which are hopelessly loosened should be removed.

CHAPTER IV.

ACUTE ALVEOLAR ABSCESS.

When pyogenic bacteria escape from the apical foramen and set up inflammation which goes on to suppuration, the result is an alveolar abscess. There are other causes, (such as a suppurating dentigerous cyst) which may lead to the formation of pus in or near the alveolus, but it is well to limit the term "alveolar" to those abscesses directly due to suppurative apical periodontitis.

The pus is at first confined within the apical space under considerable pressure, the result being that the surrounding bone undergoes absorption, the process being rapid in the cancellous tissue but receiving a temporary check when the compact bone is reached; thus it happens that a cavity of some size may be formed within the alveolus before a vent is established. (See Fig. 14). The interior of the abscess cavity is lined by the swollen and softened peridental membrane loosened from its bony attachment, but still adherent to the root of the tooth, forming the little pus-sac so often seen attached to the extremities of teeth extracted for this condition. Obedient to the law that pus travels in the direction of least resistance, the abscess in most cases penetrates

the outer lamina of compact tissue, for that is the thinner of the two, and so comes to point upon the buccal aspect of the jaw. The invasion of the soft tissues covering the bone is accompanied by considerable inflammatory œdema extending to the mucous membrane of the mouth and the tissues of the cheek. The pus travels rapidly through the softened tissues and evacuates itself inside the mouth or upon the face. In cases of acute alveolar abscess the opening is usually

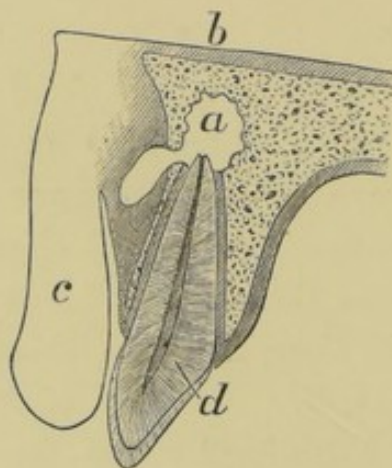


Fig. 14.—Acute alveolar abscess pointing on the gum. (a) Abscess cavity in cancellous tissue. (b) Floor of nose. (c) Lip. (d) Tooth.
(From the American System of Dentistry).

through the gum immediately over the affected root, but sometimes the periosteum becomes extensively separated from the bone, the pus accumulates between the two and eventually finds its way to the surface at the margin of the gum; such extensive detachment of periosteum is very apt to lead to necrosis of the underlying bone, especially in the case of the mandible; it is this class of abscess which is particularly prone to point upon the face, the opening being just below the chin when the trouble has started from one of the front

teeth, or at the lower border of the cheek when in connection with a molar. Such abscesses when starting from an upper incisor, not unfrequently burrow beneath the periosteum of the palate producing a soft hemispherical swelling; in these cases the pus has not the same tendency to escape at the margin of the gum owing probably to the greater thickness and closer attachment of the muco-periosteum to the bone. Despite the extensive detachment of periosteum, necrosis of the palate is not so frequent as might be expected, the bone

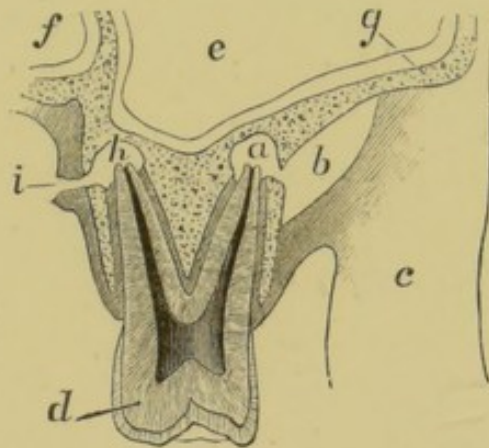


Fig. 15.—(a) Abscess cavity in bone. (b) Collection of pus between bone and periosteum. (c) Cheek. (d) Tooth. (e) Antrum. (f) Nasal cavity. (g) Malar process. (h) Abscess discharging on palate at (i). (From the *American System of Dentistry*.)

being able to maintain its vitality by the blood supply it derives from its nasal or antral aspects; but extensive necrosis does sometimes occur. An abscess in connection with the buccal roots of an upper molar may burrow between the periosteum and the bone and open upon the cheek just under the malar prominence. (See Figs. 15 and 16).

In another class of cases the pus may travel directly into a neighbouring cavity as the nostril or antrum. (Fig. 18).

In a few cases the pus finds its way to the surface along the side of the tooth travelling between the latter and its socket.

Symptoms. The symptoms of acute alveolar abscess are always preceded by those of acute local periodontitis already described. With the onset of suppuration the pain becomes more severe and of a throbbing character; the severity of the pain is due to the great tension under which the inflammatory products are pent up. The gum over the affected tooth becomes red, swollen and tender to the touch; the face is at first not much swollen; the submaxillary lymphatic glands are often enlarged and tender. Accompanying the local symptoms, there is often great constitutional disturbance the temperature rising perhaps as high as 103 deg. or 104 deg. F., and being attended by febrile symptoms of proportionate severity.

When the pus escapes from the bone the pain abates considerably but does not cease; the swelling of the gum increases and softens at its most prominent point, and if large enough fluctuates; the swelling of the face increases very much so that the features may be greatly distorted.

When the abscess bursts or is opened, all the symptoms abate very rapidly, the fever subsides, the pain stops, the swelling of the face goes down and the gum reverts to its normal condition with the exception of a small opening through which pus continues to exude for a longer or shorter time; under efficient treatment the discharge soon ceases, but if the source of irritation remains the discharge becomes chronic.

It must be borne in mind that although the great majority of cases terminate favourably, even when untreated, yet a

few cases are attended by disastrous and even fatal results. The submaxillary glands may suppurate, especially in strumous subjects, leading to serious illness and much subsequent deformity from scarring. The pus from an alveolar abscess may wander into the pterygoid region, there causing septic thrombosis which may extend through the foramina at the base of the skull to the cavernous sinus. Pearce Gould records such a case which proved fatal. Howse records a case of pyæmia following on an alveolar abscess of the lower jaw in a child, and Arbuthnot Lane records another case with pyæmic thrombosis of the veins of the neck terminating fatally. Heath mentions two cases of diffuse cellulitis of the neck leading to fatal œdema of the larynx.

Treatment. Two indications must be fulfilled (*a*) The pus must be evacuated and (*b*) the cause of the trouble (the septic matter in the pulp chamber and apical space) must be removed.

(*a*) In cases which come under the care of the dental surgeon before swelling of the gum has occurred, the pulp chamber should be opened, the root canals cleared out, and the pus evacuated through the tooth. When the pus has perforated the external plate of the jaw, and has formed a swelling on the gum, the latter should be freely incised, the incision being carried if possible through the bony wall of the abscess. Collections of pus beneath the periosteum of the palate should be freely and early incised so as to diminish the risk of necrosis. Every means should be taken to prevent the formation of an opening on the face; the external use of poultices and fomentations should be strictly forbidden; even when the skin is reddened, and pointing on the face appears inevitable this untoward result may often be

averted by painting the surface with flexible collodion, and making a free opening in the mouth. In the event of suppuration extending to the cellular tissue of the neck, free incisions should be made, having due regard to the anatomical position of important structures. Œdema of the larynx would necessitate scarification of the aryteno-epiglottic folds, or laryngotomy. The only effectual treatment of pyæmic thrombosis, is to dissect out the affected veins ; this must be done as soon as possible, or the process may have extended beyond the reach of surgical interference ; this was done by Mr. Arbuthnot Lane in the case mentioned above, but unfortunately too late, the septic matter having already become disseminated throughout the circulation.

(b) The best way of removing the septic matter from the pulp chamber and apical space will vary in different cases. If the tooth in question is one which cannot be rendered useful if retained, the sooner it is extracted the better. If on the other hand the tooth can be rendered useful, although dead, it should be saved, provided the patient can obtain efficient and appropriate treatment at the hands of a dental surgeon. The object of such treatment is to render the pulp cavity and apical space aseptic ; the methods of obtaining this result being entirely within the province of dental surgery will not be referred to here.

Constitutional treatment is in most cases limited to the use of saline aperients and remedies for the relief of pain, but in the more severe cases, especially when attended by complications, the constitutional treatment assumes more importance, and must be conducted on general principles.

CHRONIC ALVEOLAR ABSCESS.

There are two forms of chronic alveolar abscess, the *fistulous* and the *blind*.

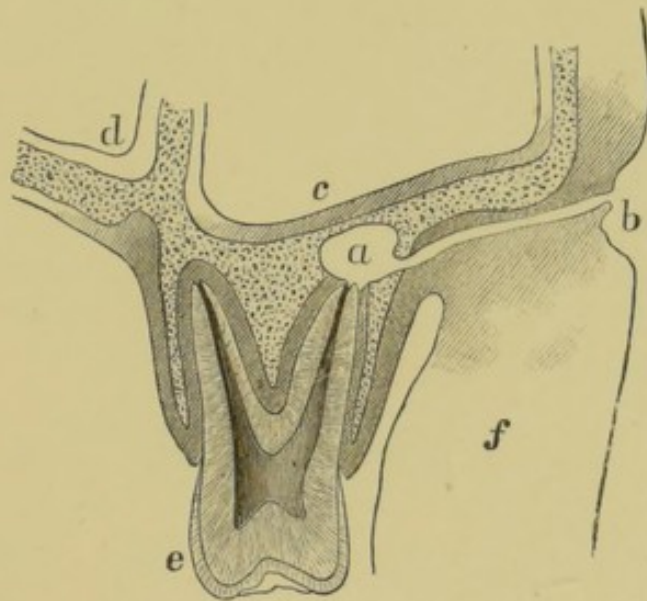


Fig. 16.—Chronic Fistulous Alveolar Abscess.

(a) Abscess cavity connected by narrow fistula with (b) opening on cheek. (c) Antrum. (d) Nasal cavity. (e) Tooth. (f) Cheek.
(From the *American System of Dentistry*.)

The fistulous variety is nearly always the sequel of an acute abscess which has failed to heal owing to the exciting cause remaining in action, but in some cases the inflammatory process may have been chronic from the first. The orifice of the fistula is as a rule situated at the spot where the original abscess burst, this being as already stated on the gum, over the affected root; but the original opening may close and a second one may form in some other situation with or without an exacerbation of the inflammatory symptoms. This process may be many times repeated, so that

eventually the discharging opening may be far removed from the original source of trouble. The direction followed by the pus is determined by the resistance of the tissues encountered and by gravitation; hence it happens that the opening is usually found below the source of the pus.



Fig. 17.—Chronic Alveolar Abscess, exposing root of Superior Incisor.
(*Museum of St. Mary's Hospital.*)

In the case of the lower jaw, the pus may find its way to the surface near the lower border of the bone, or entering the cellular tissue of the neck it may travel downwards even as far as the clavicle. In the upper jaw the opening when on the face is most commonly found just below the prominence of the malar bone in the centre of a rounded depressed scar fixed to the bone by a fibrous cord (Fig. 16).

Sometimes the pus may burrow in the direction of mucous surfaces other than the mouth; an abscess at the root of an upper incisor may sometimes discharge into the nose, leading to a mistaken diagnosis of ozæna being made. Abscesses at the root of the upper molars, especially the first, may open

into the antrum producing an empyema of that cavity (Fig. 18).

The blind variety of alveolar abscess has no external opening, and is simply a collection of pus in a bony cavity formed around the root of the affected tooth. A blind abscess may result from the closing of a fistulous opening, but as already mentioned, the usual course is for the pus to find vent again either at the same, or at some other spot. In other cases, the bacteria from the pulp chamber, being of but low pyogenic power, may have set up suppuration of such an extremely

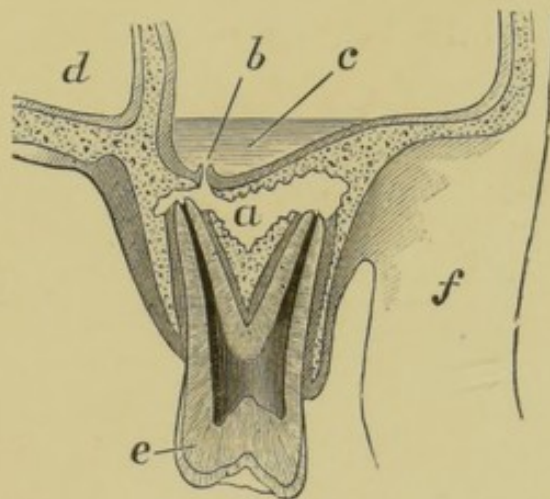


Fig. 18.—(a) Alveolar abscess at the root of an upper molar discharging into antrum at (b). (c) Pus in antral cavity. (d) Nasal cavity. (f) Cheek. (From the *American System of Dentistry*.)

chronic kind, that the resulting abscess has remained quiescent, and has never sought an external opening.

Symptoms. When the opening of a chronic fistulous alveolar abscess is immediately over the root of a carious tooth, the condition is at once recognized on inspection, but when the opening is remote the difficulty of diagnosis may be much greater. In such cases the employment of a fine probe may trace the sinus in the direction of a carious tooth,

but sometimes the track is so narrow and devious, that we do not gain much information by this means. In doubtful cases the condition of the teeth should always be carefully inquired into, and it should be borne in mind that the offending tooth is not necessarily a decayed one; a tooth pulp may die, and lead to apical trouble, while the tooth still retains appearances of integrity which may deceive those not experienced in dental affections; again, the offending tooth may be "impacted," and therefore out of sight. Not unfrequently the sinus is kept open by the presence of a small sequestrum, and will not close until this has been removed.

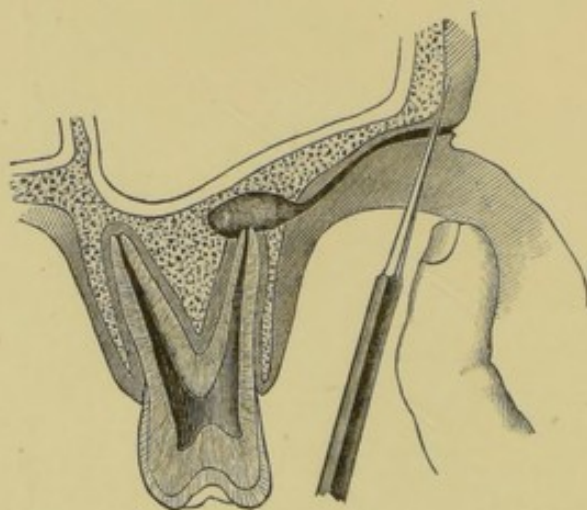


Fig. 19.—Operation for freeing depressed scar of face.
(From the *American System of Dentistry*.)

Treatment. The treatment of a chronic alveolar abscess consists in rendering the pulp cavity and apical space of the offending tooth aseptic. If this cannot be accomplished, or the prospective utility of the tooth does not warrant the attempt, extraction should be performed. When the case is complicated by necrosis, the sequestra should be removed as soon as they are loose. Even when necrosis has involved a

considerable portion of the alveolar border, the loosened teeth may sometimes be saved by careful dental treatment, and the new bone thrown out from the periosteum will afford in time a firm socket. In cases of abscess discharging on the face an attempt should be made to divert the discharge into the mouth. The depressed scar which is left by such an abscess as the one depicted in Fig. 19, may be much improved in appearance by dividing the fibrous band which binds it down to the jaw by a fine tenotome entered from the mouth.

CHAPTER V.

NECROSIS OF THE JAWS.

Causes. The immediate cause of necrosis is deprivation of blood supply. This may be brought about in different ways, it may be the direct result of injury, a portion of bone being broken off and completely severed from all vascular supply; but in the majority of cases necrosis results from inflammation of the bone or its periosteum, the circulation being arrested by the pressure of the inflammatory exudation. Inflammation leading to necrosis may be due to several different causes; it may have started in a neighbouring tissue and have spread to the jaw, (*e.g.* cancrum oris); it very often starts in connection with a decayed tooth; it may be the result of certain chemical substances, such as caustics, mercury, and phosphorus; it may be due to the presence in the blood of the specific poison of such diseases as Small Pox and other Exanthemata, Acute Necrosis (infective panosteitis) Syphilis or Struma; lastly, the cause of the inflammation may be undiscoverable; it is then spoken of as "idiopathic."

The causes of necrosis may be arranged in tabular form thus :—

CAUSES OF NECROSIS.

1. Injury.
2. Spread of inflammation from—
 - (a) Dental Disease.
 - (b) Cancrum Oris., etc.
3. Chemical Agents—
 - (a) Caustics.
 - (b) Mercury.
 - (c) Phosphorus.
4. Blood disorders—
 - (a) Exanthematous fevers.
 - (b) Infective panosteitis (acute necrosis).
 - (c) Syphilis.
 - (d) Struma.
5. Idiopathic.

Pathology. The mandible is more liable to necrosis than the maxilla ; this is owing to two causes ; firstly, the mandible is largely composed of compact osseous tissue, and therefore inflammatory products are pent up under great tension and stasis of the circulation is very apt to result ; secondly, the mandible is almost entirely dependent for its blood supply on the two mandibular arteries, which are deeply placed and almost isolated from collateral circulation, whereas the maxilla enjoys a rich blood supply from numerous vessels which anastomose freely.

The process by which the bone perishes and becomes cast off as a sequestrum, does not differ from that occurring in other bones, but the process of repair presents certain peculiarities deserving of notice.

In the maxilla repair is remarkably feeble. As a general

rule in adults there is no repair whatever ; a gap remains and is not filled in. In a very few cases some formation of bone has been noticed, but these are quite exceptional. In children the gap becomes filled up to a large extent by fibrous tissue, but no new bone is developed.

In the mandible the process of repair is remarkable for the completeness with which it is often carried out, although a few cases of non-repair are on record. As soon as the acute inflammation has subsided, the periosteum begins to throw out new bone and encloses the sequestrum in a casing which is perforated by cloacæ through which pus escapes. When the sequestrum has escaped, or has been removed, the cavity thus left is rapidly filled in by granulation tissue which subsequently ossifies. In this way, large portions of the jaw may be reproduced; the museum of St. Bartholomew's Hospital contains a remarkable specimen, showing how complete this reproduction may be. The patient, a lad of 18, from whom the specimen was obtained, suffered from phosphorus necrosis ; six months before death, the whole of the mandible was extracted, in a few weeks there was evidence of formation of new bone, and the process extended with such rapidity that at the time of the patient's death, the whole bone with the exception of the alveolar process had been reproduced, the new mandible resembling that of an old edentulous person. Heath mentions a case in which he extracted several large sequestra, including the right condyle, and yet such perfect repair ensued, that the movements of the jaw were as free as if the articulation had not been interfered with.

In patients who survive it is found that the reproduced bone is not permanent, but slowly becomes absorbed being reduced to a mere arch ; this is probably an example of atrophy

from disuse ; the new member being edentulous, is not sufficiently exercised to preserve its nutrition. As a general rule the teeth belonging to the necrosed piece of bone are lost, but this does not always happen ; sometimes the alveolar border escapes death and is still able to retain the teeth *in situ*.

Symptoms. The symptoms of necrosis vary considerably in different cases, and will be described when dealing with the different varieties of necrosis (see below). At present it will suffice to say that the symptoms may be grouped under three chief heads.

(a) Those of the disease of which the necrosis is the result.

(b) Those directly due to the presence of the sequestrum.

(c) The constitutional effects.

Treatment. The following indications are common to most cases of necrosis.

(a) *Treatment of the Cause.* When possible the cause should be removed before the evil effect is produced ; thus in those who work in phosphorus, or mercury, precautions should be taken to prevent these substances from producing necrosis (see below) and in suppurative affections of the jaws, care should be taken to prevent separation of the periosteum, by making timely incisions.

(b) *Evacuation of Pus.* Free incisions should be made (from within the mouth if possible) so as to provide free drainage ; retained pus is apt to decompose, and to aggravate the local condition as well as the general health.

(c) *Antisepsis.* The mouth must be kept as clean as possible by the frequent use of mouth-washes of Condy's Fluid or Boracic Acid ; if the patient is unable to use a mouth wash, the parts must be well syringed or mopped over with

absorbent cotton wool steeped in some suitable antiseptic, and then dusted with Iodoform or Boracic Acid powder. Cavities in the bone may be lightly packed with sal alembroth gauze soaked in Glycerine emulsion of Iodoform.

(d) *Removal of Sequestra.* Sequestra should not be removed until they are loose, but if a projecting piece of dead bone is a source of much annoyance, a portion of it may be clipped off with bone forceps even though it is not yet detached. In cases of extensive necrosis the sequestrum should not be removed until the case of new bone has attained sufficient strength to preserve the outline of the parts. When the whole bone has necrosed it is necessary to divide it at the symphysis to extract the sequestrum. Incisions for the removal of sequestra should be made within the mouth when possible; when occasion necessitates their being made from without they should be planned so that they may leave as little deformity from scarring as possible.

Some surgeons prefer to remove the dead bone at as early a period as possible without waiting for it to become detached, but the plan is not to be recommended.

(e) *Constitutional Treatment.* The patient's food must be adapted to the condition of his mouth; as mastication is in most cases impossible, the diet must be restricted to fluid or soft solid articles, such as milk, soups, essences, eggs and finely minced or pounded meat. When the sequestrum is large and prolonged suppuration occurs, the judicious use of stimulants coupled with the exhibition of quinine and iron is desirable. The swallowing of pus is apt to derange the digestive system and necessitate the use of drugs to regulate the action of the bowels and improve the appetite.

TRAUMATIC NECROSIS.

Necrosis has already been referred to as an occasional complication of fracture of the jaws. It may be brought about in two ways ; (*a*) in a comminuted fracture a piece of bone may be separated from its vascular connections to such an extent that it dies ; (*b*) suppuration may ensue and pus may burrow beneath the periosteum, and by separating it from the subjacent bone lead to the death of the latter. In this way, much bone may be lost and great deformity and impairment of function may result. Necrosis should be suspected and looked for in any case of fracture which goes on suppurating and makes little or no attempt at union. The removal of the sequestrum will soon be followed by consolidation of the fracture.

Necrosis of a piece of alveolus may follow the extraction of a tooth ; this may be due to death of a small piece of bone which has been fractured during the operation, but is more often due to osteitis set up by the tooth before removal.

NECROSIS OF DENTAL ORIGIN.

Dental disorders may lead to necrosis in three ways ; (*a*) Acute periodontitis may, without the formation of an abscess, extend to the alveolus setting up osteitis of sufficient intensity to produce necrosis. (Fig 20). Such necrosis may be limited to the socket of one tooth or may affect several ; (*b*) an alveolar abscess may form in the manner already described and strip the periosteum from its bony attachment, instead of perforating that membrane and becoming evacuated. In this way extensive necrosis may result, especially in the lower jaw. In the upper jaw extensive lifting of periosteum

may occur without producing necrosis, the bone being kept alive by the blood supply derived from its opposite aspect; (c) an abscess not unfrequently forms around an impacted lower wisdom tooth, the pus burrows, and strips up the periosteum causing death of the underlying bone.

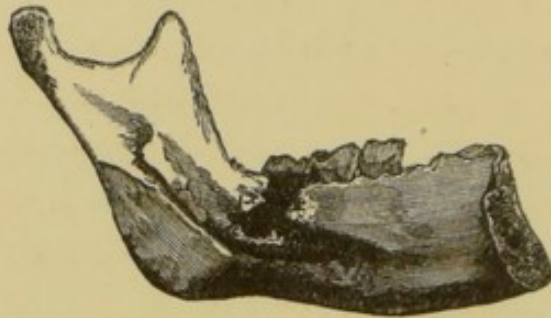


Fig. 20.—Necrosis of Alveolus resulting from Osteitis set up by a carious tooth.

(Museum of the Royal Free Hospital.)

NECROSIS SECONDARY TO ULCERATION OF THE MOUTH.

Necrosis may result from the invasion of the jaws in cases of cancrum oris, severe ulcerative stomatitis, or ulcerating malignant growths. In such cases the necrosis is of comparatively slight importance, the disease of which it is a complication being so formidable as to overshadow the lesser condition.

NECROSIS FROM CAUSTICS.

A very powerful caustic may cause immediate death of bone by destroying it in the same way that a piece of wood would be charred by strong sulphuric acid; but when necrosis follows the use of caustic substances, such as arsenious acid or Chloride of Zinc employed in dental practice, it usually results from the application exceeding the action it was intended to produce and setting up acute inflammation in the adjacent bone.

MERCURIAL NECROSIS.

Mercurial necrosis was a common affection in the days when syphilis was treated by large doses of mercury, and when the drug was not considered to have done what was required of it unless profuse salivation was produced. It was also common amongst men employed in the manufacture of mirrors when liquid mercury was used. At the present day mercury is much more sparingly used in the treatment of syphilis, and the method of silvering glass in the manufacture of mirrors has been improved, so as to diminish the risk that the workers are exposed to, consequently mercurial necrosis is now a rare condition, being practically only seen in patients who are peculiarly sensitive to the action of the drug.

The effects of absorption of an injurious amount of mercury into the system are an unpleasant metallic taste and a general inflammatory condition of the mucous membrane of the mouth. The tongue becomes furred, tender, swollen and indented by the teeth. The gums become reddened at their margins, swollen and tender. The periodontal membrane becomes inflamed, the teeth loosened and raised from their sockets and tender when pressed on. The inflammation extends to the alveolar process setting up osteitis which may be severe enough to terminate in necrosis. In some cases the osteitis and resulting necrosis is not limited to the alveolus, but may involve the whole thickness or even the whole extent of the jaw. In St. Bartholomew's Hospital museum there is a specimen of necrosis of the whole of the lower jaw which followed the administration of a few grains of calomel in a case of fever; it is possible that in this case the fever itself may have been a part cause of the necrosis.

In cases of chronic mercurial poisoning the hands and arms become tremulous, the patient becomes cachectic, sallow, emaciated and weak.

The most important point in the treatment of mercurialism is to remove the patient from the baneful influence of the drug before serious harm has resulted. The elimination of mercury from the system may be hastened by the administration of iodide of potassium. The catarrhal condition of the mouth is best treated with frequent rinsing with a two per cent solution of Chlorate of Potassium. Should necrosis ensue it should be treated on the principles already indicated.

PHOSPHORUS NECROSIS.

Phosphorus necrosis was unknown prior to the invention of lucifer matches ; it was first recognized in this country some ten years after the establishment of manufactories in London, although the disease had been previously recognized in Germany by Lorinser. The disease is caused by the inhalation of fumes emanating from phosphorus, consisting chiefly of phosphorous and phosphoric acids (H_3PO_3 and H_3PO_4). These fumes become dissolved in the saliva, and act locally upon the alveolar periosteum, which they reach through carious teeth. In opposition to this statement, various writers have held the following three views, all of which are probably wrong :—(a) that the disease is caused by arsenic, which is sometimes admixed with the phosphorus, (b) that the phosphorus is absorbed into the system and reaches the jaws by the circulation instead of directly by the saliva, and (c) that it occurs in persons with sound teeth.

The two jaws are about equally liable to the disease; if anything, the mandible is affected slightly more often than the

maxilla. The disease usually does not show itself until the worker has been exposed to the fumes for a long time, probably never under a year. On the other hand, it may occur some months after the person has ceased to have anything to do with phosphorus. The early symptoms are those of periodontitis. There is toothache, at first intermittent, but afterwards continuous. The gums swell, and become separated from the necks of the teeth, which are loose and tender on pressure. Pus wells up from the sockets. The tissues of the cheek are always much swollen; in some cases when the inflammatory symptoms are at their height, the swelling may involve the whole side of the head and face, and even the neck. In most cases openings form upon the face as well as inside the mouth, and from them pours a copious discharge of sanious offensive pus. The constitutional symptoms are severe and are due to septic absorption, to the ingestion of decomposing pus, to inability to take food, and to the severe pain which is endured. Death may occur at an early period, when the inflammatory condition is at its height, or the patient may survive this stage to perish later from exhaustion due to long continued hectic and suppuration. In some cases recovery with extensive scarring and deformity ensues.

No repair occurs in the maxilla, but in the mandible the new bone formed by the periosteum closely resembles pumice stone, and adheres firmly to the sequestrum, some of it usually coming away when the latter is removed. Microscopically this pumice-like deposit presents the following peculiarities:—The Haversian canals are very large, and are at right angles to the bone, instead of parallel to it; they interlace and end with open mouths on the surface; the deposit is laminated in structure, and its matrix is brittle and

powdery. This curious formation is almost peculiar to cases of phosphorus disease, but has occasionally been met with in necrosis due to other causes.

The most important point in the treatment of phosphorus disease is prevention. Amorphous phosphorus is innocuous, and should always be employed instead of the injurious variety. Persons who are compelled to work with ordinary phosphorus should observe scrupulous cleanliness and should work in well-ventilated rooms. They should take great care of their teeth, and should have any carious spots carefully filled. No person with carious teeth should be exposed to the fumes of phosphorus. Should the disease occur, the person affected should be at once removed to healthy surroundings and any suspicious teeth extracted; any swelling of the gum should be very freely incised. When necrosis has actually occurred, treatment must be conducted on the general principles already described.

EXANTHEMATOUS NECROSIS.

Necrosis of the jaws is one of the numerous *sequelæ* which may occur during convalescence from the eruptive fevers. It is commonest after scarlet fever, but occurs also after measles, small pox and typhoid. It is most often met with in children of about five, an age at which developmental changes in the teeth are actively proceeding. The necrosis does not commence until some weeks have elapsed since the subsidence of the fever, and the extent of the necrosis bears no relation to the severity of the original disease; very often the patient appears to be in good health.

Symptoms. The onset of the disease is insidious; there

are no active inflammatory symptoms and pain is usually slight or absent ; fœtid breath is usually the first symptom that directs attention to the mouth. On inspection it is then seen that the gum is red and tumid and more or less stripped up leaving the subjacent alveolus bare, and that from beneath the gum fœtid pus exudes. As a rule the necrosis is limited to the alveolus and is symmetrical, that is to say it affects the same parts on both sides of the jaw either simultaneously or in rapid succession ; but this is not always so, the sequestrum depicted in Fig. 21 involves the whole depth of the jaw

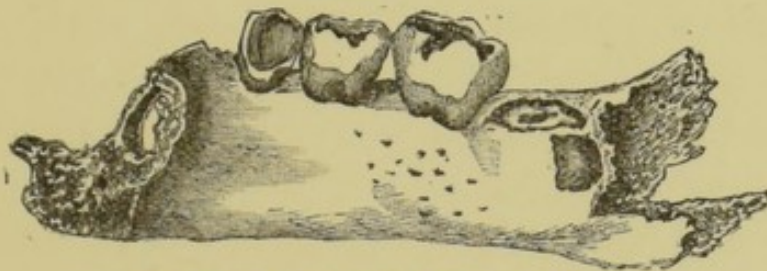


Fig. 21.—Necrosis after Small Pox.
(From the Museum of St. Mary's Hospital.)

and affects only one side ; it was removed from a little girl of five convalescent from small pox.

The Treatment presents no peculiarity.

“ ACUTE NECROSIS ” (INFECTIVE PANOSTEITIS).

This disease which is probably the effect of a specific micro-organism in the blood, is most commonly seen in the tibia, but sometimes affects the jaws. It has been described by Senftleben under the name of “acute rheumatic periostitis.” It may occur in healthy persons with sound teeth after exposure to cold. It is accompanied by violent pain, great swelling of the affected part and intense fever. The most important

point in the treatment is to make free incisions into the swollen part whether suppuration has occurred or not.

SYPHILITIC NECROSIS.

Affections of bones in secondary syphilis are usually slight and transitory, but in the tertiary stage inflammation of bone and periosteum is apt to produce necrosis. The lower jaw is but rarely affected. It is in the palatine process of the superior maxilla that syphilitic necrosis is so often met with. In some cases the sequestrum does not involve the whole thickness of the bone, and no perforation of the palate results ; in other cases a small perforation occurs, but closes again when the sequestrum has come away ; in more severe cases a permanent perforation of the palate results, causing marked impairment of speech ; occasionally a large sequestrum from the hard palate may be discharged through the nose without the muco-periosteum of the mouth having been damaged.

Treatment. Iodide of potassium must be administered until the sequestrum has come away and all inflammatory trouble has ceased. With this drug, tonics such as quinine or cinchona may be advantageously combined. The mouth must be kept clean with antiseptic washes. Should a perforation of the palate occur, it should be covered over by a well-fitting obturator attached to the teeth ; on no account should the opening be plugged, as the constant pressure thus exercised would enlarge the aperture by causing absorption of the surrounding bone. The museum of St. Bartholomew's Hospital contains a curious specimen illustrating this point. It is the skull of an old woman who had lost the whole of her hard palate. She had filled in the gap with a bung of cork,

around which was wound a quantity of tape to adapt the plug to the increasing size of the aperture.

In some cases where the aperture is small and the general health good, the parts may be successfully restored by a plastic operation.

STRUMOUS NECROSIS.

Strumous inflammation of the jaws is not common, but one sometimes sees cases of chronic osteitis and periostitis of the jaws, (most often the mandible) in young strumous subjects in which extensive caries and necrosis results.

The treatment consists in improving the general health by tonics, sea air, etc., and in scraping away all the carious bone and diseased periosteum.

IDIOPATHIC NECROSIS.

Lastly, it is necessary to mention that cases of necrosis of the jaws are sometimes met with, to which it is impossible to assign a cause ; they are called "idiopathic." Their treatment must be conducted on general principles.

CHAPTER VI.

EMPYEMA OF THE MAXILLARY ANTRUM.

This disease may result from blows on the face with or without fracture of the maxilla, operations involving the antrum, the presence of foreign bodies in the cavity, and the occurrence of necrosis of its bony wall ; but in the great majority of cases empyema is secondary either to *nasal* or *dental* disease. Authorities differ as to the relative frequency of these two chief causes ; dental surgeons see more cases arising from dental than from nasal diseases, but with specialists in diseases of the throat and nose this experience seems to be reversed.

With regard to the causal connection between antral and nasal disease our knowledge is not at present very definite. It is well known that the mucous lining of the antrum is anatomically continuous with that of the nose and that therefore inflammatory affections starting in the latter may spread by continuity to the former. It is probable that acute nasal catarrh may spread to and involve the antrum, but our present means of diagnosis do not enable us to recognise an inflammatory condition of the antrum which has not gone beyond the catarrhal stage. Chronic hypertrophic conditions of the

nasal mucous membrane especially in the region of the middle meatus are often found to be associated with similar conditions of the antral lining, and so-called mucous polypi which are now regarded by most authorities as being of inflammatory origin, are not unfrequently found coexisting in the middle meatus and in the antrum. In some cases nasal polypi seem to be the result of the irritation produced by pus flowing from the antrum, and in others, antral trouble is secondary to and dependent upon the presence of polypi in the region of the ostium maxillare.

With regard to the dental causes of empyema antri our knowledge is more definite. We know that the roots of the first and second molar teeth often form prominences in the floor of the antrum and are only separated from the mucous lining by a very thin plate of bone; in the case of the first molar even this thin bony covering is sometimes absent, so that an abscess occurring at the apex of one of the roots would open into the antrum more readily than elsewhere.

Sometimes an alveolar abscess in connection with a canine or incisor tooth may open into the antrum although the roots of these teeth are not usually in relation with this cavity.

Clinically, cases of empyema antri may be subdivided into two classes which differ greatly in the symptoms manifested. In the first variety the ostium maxillare is patent, and the patient's complaint is of a discharge from the nose; in the second variety the ostium is blocked and it is a swelling of the face that leads the patient to seek advice.

EMPYEMA WITH PATENT OSTIUM MAXILLARE.

The discharge from the nose is nearly always from one side only, but sometimes both antra are affected and the discharge

is bilateral ; it is intermittent, coming away when the patient's head is placed in any position which puts the ostium maxillare below the level of the fluid in the antrum, thus in the recumbent position, especially when lying on the side opposite to the affected antrum, the pus trickles down the throat and is swallowed or expectorated ; in the erect position pus flows from the nostril on inclining the head forwards and towards the healthy side. It is often stated as a diagnostic point that if after cleansing the nose, pus re-appear in the middle meatus, on the patient going on his hands and knees and hanging his head down and inclined away from the affected side, the source of the discharge must be the antrum ; but it must be remembered that the same phenomena may be produced in cases of empyema of the frontal sinus. The discharge has a peculiar odour often compared to that of bad fish ; the smell is perceived by the patient but not by those around him. The constant swallowing of decomposing pus is very apt to upset the digestive functions and may seriously impair the general health.

Pain is usually absent or so slight as to be of no importance. Swelling of the face does not occur unless it is due to some other cause.

The following methods of examination may be used to complete the diagnosis.

(a) *Catheterisation of the Ostium Maxillare.* It is possible to pass a hollow instrument into the antrum through the ostium and to draw off pus, but the method of examination has not been found to be of any practical value.

(b) *Percussion* over the maxilla may yield a difference of resonance on the two sides, but the size of the air chamber is

insufficient to give a percussion note of any real diagnostic value.

(c) *Transillumination* is of considerable value. An electric lamp such as the one depicted in fig. 22 is introduced into the patient's mouth. The room must be quite dark. When the oral lamp is turned on, the cheeks and lower eyelids become illuminated; sometimes the pupils are illuminated and look dullish red instead of black, and the patient himself may perceive the light which reaches his eyes through the maxilla. In well-marked cases of unilateral empyema the transillumination is much greater on the healthy than on the

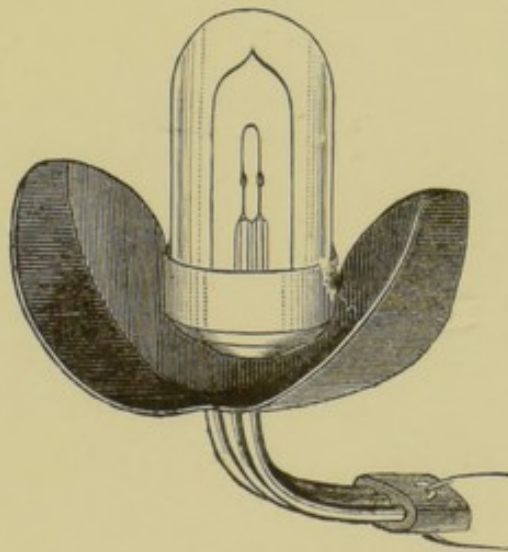


Fig 22.—Stevenson's Oral Lamp.

diseased side especially in the outer part of the infra-orbita region. Although very valuable, transillumination is not always conclusive, since the bones may not be symmetrical in thickness, or the antra in size, shape and partitioning. Sometimes both sides of the face remain opaque on transillumination; this may be due to the presence of an empyema

on both sides or it may be due to unusual opacity of the tissues or to insufficient illumination power in the lamp.

(d) *Exploratory puncture* is the only certain means of diagnosing the presence of pus in the antrum. The puncture may be made through the empty socket of the first or second molar tooth, through the canine fossa or through the inferior meatus of the nose. The exploratory puncture should be performed as aseptically as possible, lest suppuration be set up in a previously healthy antrum.

Treatment. There is considerable divergence of opinion as to the best method of treating these cases. In a few cases due to dental decay the disease disappears spontaneously after removal of the offending tooth, but in the vast majority of cases it is necessary to drain the antrum and irrigate its cavity with antiseptic and astringent lotions. It is impossible to treat all cases successfully in the same way; our method of treatment must be adapted to the pathological nature of the case as far as our means of diagnosis enable us to do so. It will be advisable therefore to describe the methods of treatment usually employed and then to indicate as far as possible how we should determine the most suitable kind of treatment for each particular case.

(1) *Opening through alveolus.* This is the method which is most commonly adopted after extracting a decayed molar tooth. An opening is made into the antrum through the apex of the alveolus by means of an antrum perforator (Fig 23) or a drill worked by the dental engine.

Sometimes after extraction it is found that the socket already opens into the antrum; it is then only necessary to enlarge the opening to a size sufficient to admit the drainage tube; this may be accomplished with a bur about $\frac{3}{16}$ of an inch in

diameter. The drainage tube should consist of a plain straight gold tube attached to a plate fitting the adjacent teeth. The lumen should be at least an eighth of an inch in diameter; many tubes are made so narrow that the smallest drop of pus occludes them; the upper end of the tube should just reach



Fig. 23.—Antrum Perforator.

the antrum, and should not project into it or it will not act as a drain until the pus has accumulated in the cavity sufficiently to reach the level of the extremity; the mouth of the tube should be provided with a plug which can be inserted by the patient at meal times so as to prevent the entrance of food. The tube having been satisfactorily adapted, the patient is prescribed a lotion consisting of ten grains of sulphate of zinc

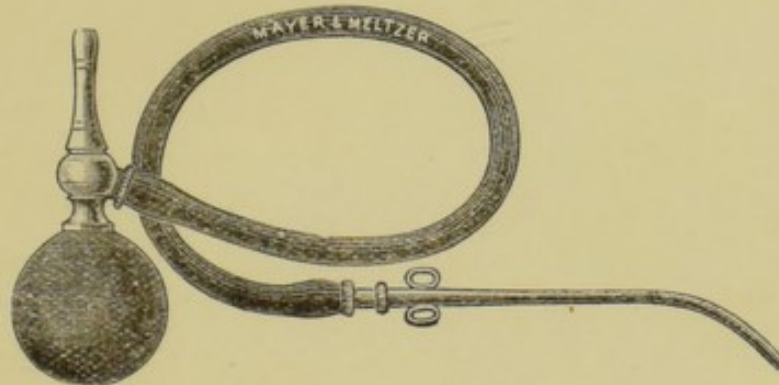


Fig. 24.—Heath's Injecting Apparatus.

and ten grains of carbolic acid to the ounce of water; of this lotion one teaspoonful should be added to a tumbler of tepid water for each injection. A very suitable apparatus for injection is that shown in Fig. 24. The patient, seated before a mirror, injects until the fluid returns clean through the

nose. The injection is performed twice daily, and then at longer intervals as the discharge diminishes. When the injection brings away no pus after a week's interval, the tube may be removed. In this way many cases may be cured, but the treatment must usually be carried on for five or six months.

2. *Opening through the Nose.* The natural opening into the meatus is much too high to be of any value for purposes of drainage or irrigation. It is therefore necessary to make an opening through the outer wall of the inferior meatus. The opening should be made by means of a Krause's trocar introduced through the outer wall of the meatus well behind the anterior extremity of the inferior turbinated body so as avoid injuring the nasal duct. The cavity is then washed out with a suitable antiseptic or astringent lotion. In this method of treatment, the injection cannot be done by the patient himself.

3. *Opening through the Canine fossa.* The lip having been well retracted, an opening is made about half an inch above the margin of the alveolus and half an inch external to the prominence produced by the root of the canine tooth. If it is only desired to wash out the cavity it will suffice to puncture with a trocar and canula. The opening may be kept patent by means of a small spiral spring tube attached to the teeth. If it is desired to explore the interior of the antrum, and curette the lining membrane, it is necessary to make an opening with a chisel or gouge large enough to admit the finger. In making such a large opening it is desirable to leave the disturbed portion of bone still attached by one aspect so that when the operation is concluded it may

fall back into place like a valve. No bone should be completely removed.

It now remains to discuss the all-important question as to what method of treatment should be adopted in any given case, and here the great difficulty we have to contend with is that we are unable to discover the exact nature of the pathological changes which have taken place in the antrum ; we do not know whether the mucous lining is simply inflamed and secreting pus, or whether it is greatly thickened and altered in structure, or whether polypi are present, or whether there is any necrosis of the bony wall, or whether the cavity is divided by septa to such an extent as to render drainage by a single opening impossible. These considerations coupled with the tedious course that these cases often pursue under treatment have lead some surgeons to advise the making of a large canine fossa opening in every case ; but other surgeons recognising the fact that many cases are cured by simple drainage and irrigation object to the performance of the larger operation. For my own part, if there is a carious tooth present, I advise that it should be extracted, and the antrum drained and irrigated through the vacant socket in the manner already described. If the disease is not cured in six months, I advise the making of a large canine fossa opening, so that the nature of the antral disease can be discovered and dealt with effectually. In cases which refuse to get well with alveolar drainage properly carried out, it is usually found either that the mucous lining is much thickened and polypoid in nature, or else that the presence of septa has prevented the whole of the cavity from being drained. Diseased mucous membrane should be removed with a curette

and obtrusive septa should be cut away. If the ostium maxillare should be found blocked, it is desirable to make an additional opening through the inferior meatus. After the operation the antrum should be filled with a long strip of gauze soaked in iodoform emulsion ; after twenty-four hours the gauze is removed, and the cavity syringed twice daily until the discharge ceases ; this usually occurs in a fortnight or three weeks. Some operators have found great difficulty in getting the opening to close, whilst others have complained of inability to keep the opening patent long enough to effect a cure ; the tendency of the opening to close, or remain open, depends on the size of the original opening, and whether any bone has been removed or not. If care be taken to make the opening in the way described, it may be kept open as long as desired by the introduction of some form of plug, and will close spontaneously when allowed to do so.

If there is no carious tooth present it is not justifiable to remove a sound one for purposes of alveolar drainage. In such a case drainage and irrigation should be effected through the nasal route if the patient can attend often enough, or through a small canine fossa opening if he must himself conduct the after treatment.

If there is any polypoid condition in the nose and no evidence of dental disease it is advisable to proceed at once to exploration of the antrum by means of the large canine fossa opening.

EMPHYEMA WITH BLOCKED OSTIUM MAXILLARE.

When the opening into the middle meatus is blocked the symptoms differ widely from those just described. There is

no nasal discharge, but the pus increasing in quantity distends the antrum producing a swelling on the face. (Fig. 25.)



Fig. 25.—Empyema of antrum with blocked ostium maxillare.

The rapidity with which this distension occurs varies considerably in different cases. Sometimes the distension is rapid and is accompanied by symptoms of acute or subacute inflammation ; there is pain at first of a dull deep-seated character but soon becoming more acute and lancinating and attended with tenderness of the cheek and general febrile disturbance. Sometimes the distension takes place not only in the direction of the cheek but also towards the nose, obstructing respiration on the affected side, and towards the eye displacing that organ and interfering with vision.

In the acute or subacute varieties the empyema soon bursts either into the mouth, the nose, or the orbit, in the latter case producing dangerous and sometimes fatal cellulitis.

In the more chronic cases the distension extends chiefly in

the direction of the face producing a swelling indistinguishable from a cyst except by exploratory puncture. In such a case the important point in diagnosis is to determine that the antrum is distended by fluid and not by a new growth. It is often possible to obtain fluctuation and the so-called egg-shell crackling through the thinned-out bony wall, but no time should be lost in making an exploratory opening, the surgeon being prepared at the time to grapple with any morbid condition he may find.

Treatment. The swelling must be freely opened where it bulges inside the mouth and the contents of the antrum dealt with according to the condition found. An opening should be made in the inferior meatus if the patency of the ostium cannot be readily re-established. Any carious tooth in connection with the antrum should be removed.

CHAPTER VII.

ODONTOMES.

Odontomes are tumours composed of dental tissues in varying proportions and different degrees of development, arising from tooth-germs or from teeth still in the process of growth. (Bland Sutton.)

As the pathology of this class of tumours is intimately connected with the development of the teeth, it will be well to remind the reader how a tooth is formed.

Early in intra-uterine life the epithelium of the gum sends down a process into the subjacent tissue extending the whole length of the jaw (*common enamel germ*). From the deep aspect of the common enamel germ a number of flask-shaped epithelial bodies project (*special enamel germs*). Each is connected with the common enamel germ by a narrow band of epithelial cells (*funicular bands*). Each special enamel germ is met and indented by a differentiated portion of the subjacent connective tissue (*dental papilla*), the arrangement being comparable to a finger pressed into a flaccid india-rubber ball. The connective tissue around the papilla and enamel germ becomes

fibrillated and forms a kind of capsule (*dental sac* or *follicular wall*). The complete structure is called a *dental follicle*.

The enamel germs of those permanent teeth which replace temporary ones are formed by an outgrowth from the funicular band. Sometimes an epithelial outgrowth springs from the funicular band of the permanent tooth, and represents the enamel germ of the third dentition of some animals.

The enamel germ of the first permanent molar is given off from the posterior extremity of the common enamel germ. The enamel germ of the second molar springs from the funicular band of the first, and that of the wisdom tooth from the funicular band of the second. The whole of the epithelium of the enamel germs does not become converted into enamel, the funicular bands and rudimentary third enamel germs remaining as collections of cells under the gum and in the alveolo-dental ligament. Occasionally these embryonic remains spring into activity after all dental development has ceased, giving rise to some interesting tumours to be considered presently. The permanent teeth are surrounded by bone except where the funicular band remains. In this situation there is a canal in the bone (*iter dentis*) occupied by a fibrous band (*gubernaculum*) containing epithelial remnants of the funicular band. The permanent tooth reaches the surface and is "cut" by travelling along the iter.

The following table shows at a glance the portion of the tooth and the kind of tumour attributable to each part of the embryonic structure :—

EMBRYONIC STRUCTURE	ADULT STRUCTURE	TUMOUR
Enamel Organ	Enamel	Epithelial Odontomes and one form of dental cyst
Papilla	Dentine and Pulp	Radicular Dentomata and Osteo-dentomata
Dental Sac or Follicular wall	Cementum	Cementomes Fibrous Odontomes Follicular Odontomes Compound Follicular Odontomes
Complete germ	Tooth	Composite Odontomes

EPITHELIAL ODONTOME.

Although this disease was first described seventy years ago it is only during the last few years that its true pathology has been appreciated. The older works on Surgery called it multilocular cystic disease, cystic sarcoma, and adeno-sarcoma; the first of these names accurately described the naked-eye appearances of the tumour, but the two other names erred in inferring the microscopical structure from the macroscopical appearances. In 1879 Falkson and Bryk recognized that in microscopical structure the tumour was almost identical with the enamel organ. In 1882, Eve whilst recognizing the true structure of the tumour attributed its origin to an overgrowth of the epithelium of the gum of a cancerous nature, a view not in keeping with the clinical history of these growths.

Morbid Anatomy and Pathology. These tumours most commonly affect the mandible. They grow between the

plates and expand them in an irregular manner. On section the tumour is seen to be composed of a congeries of cysts varying in size from an inch in diameter down to minute cavities too small for the eye to perceive. The cysts usually contain a brownish mucoid fluid. They are separated from one another by solid septa which are composed partly of the expanded and displaced bone and partly of a reddish-brown material which consists of the proper tumour substance which has not as yet become cystic.

The method in which the cysts are formed is explained by a microscopic examination of a section of the solid portion of



Fig. 26.—Epithelial Odontome of Mandible.
The tumour consist of a congeries of cysts of varying size.

(From the Museum of St. Mary's Hospital.)

the tumour. It is then seen that the tumour consists of columns of epithelial cells separated from each other by connective tissue septa. The epithelial cells appear to be arranged in rounded alveoli, but the appearance is simply due to the long

tortuous columns of cells being cut across. The cells at the periphery of each column are columnar in shape, but as we trace them towards the centre, we find that they are undergoing mucoid degeneration so that small spaces are formed. It is by the distension of these spaces that the large cysts are formed.

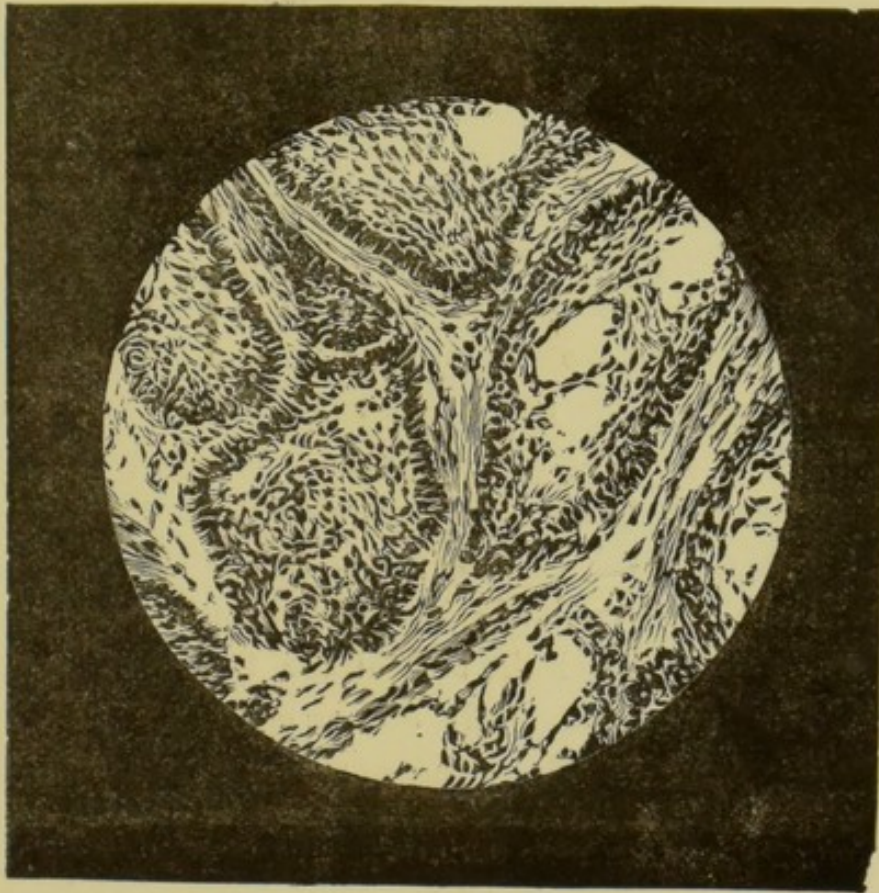


Fig. 27.—Section of an Epithelial Odontome.
From a photo-micrograph—Magn. 100 diam.

The section of these epithelial columns presents a very close resemblance in structure to an enamel organ, but there is never any formation of enamel.

The connective tissue stroma of the tumour is composed of

fibrous tissue with a few nucleated cells, and contains but few blood vessels.

These tumours are supposed to originate from those portions of the enamel germs which do not in the ordinary process of development become converted into enamel (*paradental epithelium*). We are completely in ignorance as to why these cells should lie dormant for years and then suddenly start into activity as if they were afflicted with a nightmare and felt compelled to grow into enamel organs of fanciful shapes and extraordinary dimensions.

Clinical characters.—This disease may occur at any age, but is most commonly seen about the age of twenty. It most often affects the molar region of the mandible; when it affects the maxilla the tumour usually occupies the antrum. It grows very slowly; a tumour the size of an orange may have been growing for ten years. It expands the jaw, sometimes equally in all directions, sometimes the inner and sometimes the outer plate is more bulged than its fellow. The surface of the tumour is rounded and more or less lobulated. To the touch the bulk of the tumour is of bony hardness, but there are usually one or more spots where the growth can be indented by the finger, showing that it is really cystic. Sometimes one or more of the cysts burst into the mouth and discharge a dark brown fluid. Some of the teeth belonging to the affected portion of jaw are very often missing, and those that are present are usually much disturbed in position. The neighbouring lymphatic glands are not affected. The disease does not recur locally after complete removal, and dissemination in other parts of the body does not take place. It will be seen therefore that the disease is essentially innocent in nature, as innocent in fact

as the ordinary fibro-adenoma of the breast. But this is not always so ; sometimes the connective tissue stroma instead of being purely fibrous is sarcomatous in nature. In such tumours recurrence *in situ* and dissemination may take place. It is very doubtful if the epithelial elements of the tumour are ever malignant. Heath records a case (Diseases of the Jaws, p. 206), in which a typical epithelial ulcer appeared in the situation from which a "cystic sarcoma" had been removed eleven years previously; the facts recorded in reference to this case are very far from sufficient to prove that the original tumour was a malignant one.

Treatment. The whole growth must be completely removed, but it is not necessary to remove any surrounding healthy tissue. If the growth be not completely removed the portion left behind will continue to grow, and will in time produce a tumour as large as the original one ; this is not recurrence in the sense in which the word is used when speaking of malignant tumours.

The operative procedure necessary to remove the growth must be determined in each case by its size and situation. If it be small and accessible from the mouth, it is better to operate from within so as to avoid deformity from scarring. An incision must be made through the mucous membrane of the mouth, and the growth completely gouged away, so that nothing remains but a cavity with healthy bony walls. The bony walls, if much expanded, may be pressed together, care being taken not to fracture the jaw.

If the growth be too large to be dealt with from inside the mouth, it must be exposed through an incision on the face so planned as to leave the smallest and least noticeable scar.

The cavity in the bone is allowed to granulate up, so that the site of the tumour becomes filled with fibrous tissue.

The solid portions of the tumour should be examined microscopically, particular attention being directed to the connective tissue stroma between the epithelial columns. If the connective tissue contain any sarcomatous elements, recurrence of the growth may be feared, but if formed of mature fibrous or fibro-cellular tissue the cure will be permanent. If recurrence takes place, the affected half of the bone should be removed.

DENTAL CYSTS.

Under this name authors have described two conditions which closely resemble each other clinically and in naked-eye appearance, but which differ essentially in their pathology. One is a form of odontome, and the other is of inflammatory origin. As one clinical description will serve for both kinds of cysts, it will be convenient to describe them together.

Symptoms. They are met with more frequently in the maxilla than in the mandible, and generally in the neighbourhood of the incisor or canine teeth. They are usually of small size, and come away with the tooth when it is extracted, but sometimes they may attain considerable dimensions, and may cause more or less expansion and absorption of the outer wall of the maxilla, so that the bone crackles when pressed with the finger. Sometimes they may involve the antrum secondarily, by causing absorption of the intervening bone. They are always unilocular, and do not contain any tooth or rudiment of a tooth. The fluid which they contain may be clear yellow or reddish serum, a thick glairy fluid of varying colour, or a semi-purulent fluid. The

growth of the cyst is usually slow and painless ; one or more teeth in the neighbourhood are often carious.

Pathology. Microscopic examination shows that some of those cysts are lined by a layer of epithelium similar to that of the enamel organ, and that others are destitute of any such lining.

The first variety is supposed to be formed from the paradental epithelium. It is therefore closely allied in nature to the epithelial odontome already described, but differs from it in that the cyst is unilocular and is devoid of the solid epithelial columns found in the multilocular tumour. Some authorities think that the paradental epithelium may be started into activity by the irritation of a carious tooth in the immediate vicinity. To distinguish it from the other form of dental cyst this condition might well be termed "unilocular cyst or odontome."

The second variety is of inflammatory origin and is always found in connection with a diseased tooth. The inflammation starts in the apical space in the same way as an alveolar abscess, but the process is extremely chronic and leads not to the formation of pus, but to an accumulation of serous fluid enclosed within a fibrous sac. For this variety of dental cyst the old term "periosteal" may very well be retained.

Treatment. The treatment of dental cysts is the same as that of follicular odontomes (dentigerous cysts).

RADICULAR ODONTOMES.

Radicular odontomes arise after the crown of the tooth has been completed and whilst the roots are still in the process of formation. The tumour consists of dentine and osteo-dentine in varying proportions ; when the former tissue preponderates

it is called a radicular dentoma ; when the latter is in excess, a radicular osteo-dentoma. Fig. 28 and 29 represent Salter's



Fig. 28. Radicular Odontome (Salter).

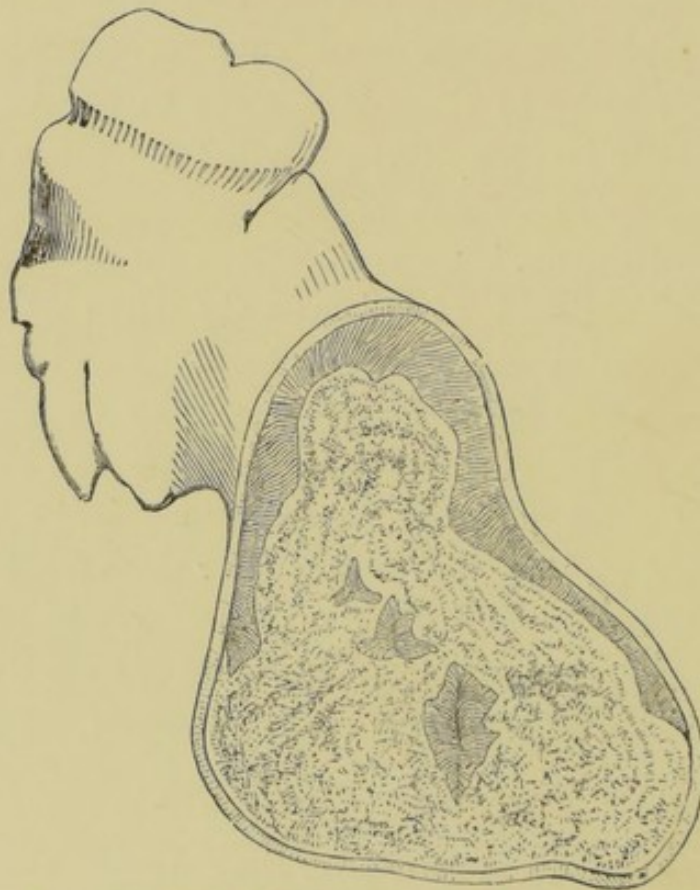


Fig. 29.—A section of the same tumour as Fig. 28 enlarged (Salter).

well-known specimen. The outer layer of the tumour is composed of cementum, within which is a layer of dentine

incomplete below. The central part is formed of calcified tooth pulp, and contains a confused mass of bone and dentine.

Radicular odontomes are rare in man, but are common in other mammals especially rodents. They are often multiple. They frequently lead to suppuration.

The symptoms of this and of other varieties of hard odontomes are so misleading that, according to Bland Sutton, up to the present time no case has been correctly diagnosed before the removal of the tumour; most often they have been mistaken for exostoses, for necrosis or for unerupted teeth. The treatment consists in removing the tumour, scraping out the cavity and allowing it to granulate up.

CEMENTOMES.

When the capsule of a tooth follicle becomes greatly thickened and ossified, the contained tooth comes to be embedded in, or attached to, a mass of cementum. This form of odontome is shown in Fig. 30. Cementomata occur most



Fig. 30.—Cementome (*Forget*).

frequently in horses, and may attain a large size, one specimen weighing seventy ounces.

FIBROUS ODONTOMES.

A fibrous odontome consists of a tooth enclosed within a greatly thickened tooth sac. The latter is so thick that it

prevents the tooth from erupting. Fibrous odontomes are commonest in ruminants, especially goats. They are often multiple. According to Bland Sutton the thickening of the tooth capsule is due to rickets. They have usually been mistaken for fibrous or myeloid tumours.

FOLLICULAR ODONTOMES (DENTIGEROUS CYSTS).

Follicular odontomes are more often met with in the mandible than in the maxilla. The cyst wall is composed of a thickened and expanded dental sac, and usually contains calcareous or osseous matter. The fluid inside the cyst is usually clear and watery, but may be viscid, sanious or gelatinous; sometimes, though rarely, the cyst contains a thick putty-like material composed of degenerated epithelial cells. Sometimes no trace of a tooth is found inside the cyst, the process of expansion having taken place at so early a period

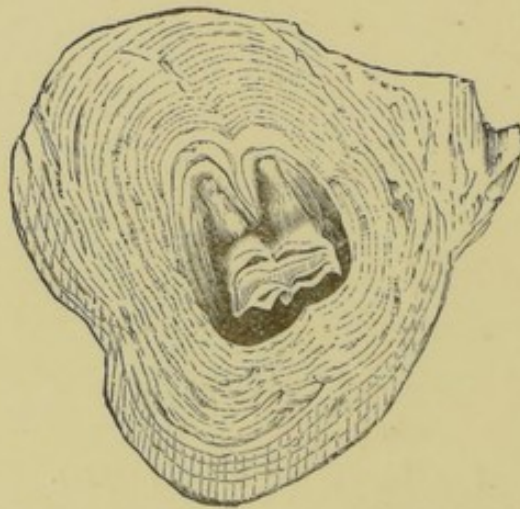


Fig. 31.—Fibrous odontome from a goat (*Bland Sutton*).

that the dental papilla has become absorbed before it has had time to form any dental structure. The great majority of follicular cysts contain some portion of a tooth. The tooth may be complete and may be free in the cyst, but it is

usually implanted in the cyst wall, with its crown projecting into the cavity, the roots being truncated or imperfectly developed. Occasionally the tooth is inverted. Follicular cysts are almost invariably in connection with the permanent teeth, especially the molars. The specimen depicted in Fig. 32 contained the crown of the second molar tooth, and was removed from the mandible of a boy eleven years old.



Fig. 32. — Follicular Odontome or Dentigerous Cyst.

Occasionally the encysted tooth is a temporary or even a supernumerary one.

There is some difference of opinion as to the exact manner in which a dental follicle becomes distended to form a dentigerous cyst. All observers agree that the fluid collects between the tooth and the follicular wall. Broca attributes the presence of this fluid to morbid degeneration of the cells of the enamel organ. Malassez attributes it to hypertrophy of these same epithelial cells. According to Tomes a small quantity of fluid is normally formed between a tooth and its sac, and is discharged when the tooth is cut ; any cause impeding the eruption of the tooth leads to excessive accumulation of this fluid. According to Alberran this impediment to

eruption is most often furnished by a blocked condition of the *iter dentis*.

Symptoms. Follicular cysts are most frequently seen in the mandible of young people. They form slowly growing tumours which expand the plates of the bone. Whilst they are still small and are covered by a thick layer of osseous tissue they feel solid and may easily be mistaken for solid tumours ; but sooner or later the bony wall becomes so attenuated that it can be indented by the finger ; they are then easily recognized as cystic swellings. Usually the swelling is more or less hemispherical and projects from the surface of the jaw, but in some cases the whole body of the bone may be evenly expanded in all directions. An examination of the mouth will often show that there is a permanent tooth missing, but too much reliance must not be placed on this deficiency. The tooth may have been removed or it may be absent as the result of individual peculiarity ; on the other hand the number of teeth in the mouth may be correct and the cyst may contain a supernumerary tooth or one not usually cut until a later age, thus the cyst depicted in fig. 32 contained a twelve-year-old molar, and was removed from a boy eleven years old. In many cases a diagnosis is not possible until an exploratory incision has been made. Such incisions should not be made unless the surgeon is prepared to complete the necessary treatment at the same sitting, especially when the cyst is a large one, for the contents are very likely to become septic and give rise to a great deal of trouble. Follicular cysts very rarely suppurate unless they have been interfered with.

When these cysts occur in the maxilla they very often project into the antrum, and may be indistinguishable from

other cystic swellings in this situation until they have been opened.

Treatment. The necessary incision can nearly always be made from within the mouth, but in large or awkwardly placed cysts it may be necessary to make the incision from without. The cyst must be freely opened by removing a portion of the cyst wall. The contained tooth and the lining membrane must be removed. The expanded walls may then be squeezed in so as to diminish the size of the cavity. The latter must be filled with an antiseptic dressing which should be renewed every day and the cavity syringed out with a weak antiseptic solution.

COMPOUND FOLLICULAR ODONTOMES.

According to Bland Sutton this odontome results from sporadic ossification of a thickened follicular wall, and contains a number of small teeth or denticles composed of cementum and dentine, or even of cementum, dentine and enamel. The following case recorded by Tellander may be quoted as illustrating this variety of tumour. The patient was a woman aged twenty-seven years. "The right upper first molar, bicuspids, and canine of the permanent set had not erupted, but the spot where these teeth should have been, was occupied by a hard painless enlargement, which the patient had noticed since the age of twelve years. Subsequently this swelling was found to contain minute teeth. There were nine single teeth each one perfect in itself, having a conical root with a conical crown tipped with enamel, also six masses built up of adherent single teeth. The denticles presented the usual characters of supernumerary teeth." (Sutton).

COMPOSITE ODONTOMES.

These tumours consist of a disordered conglomeration of enamel, dentine and cementum, and arise from an abnormal growth of all the elements of a tooth germ, viz. enamel organ,

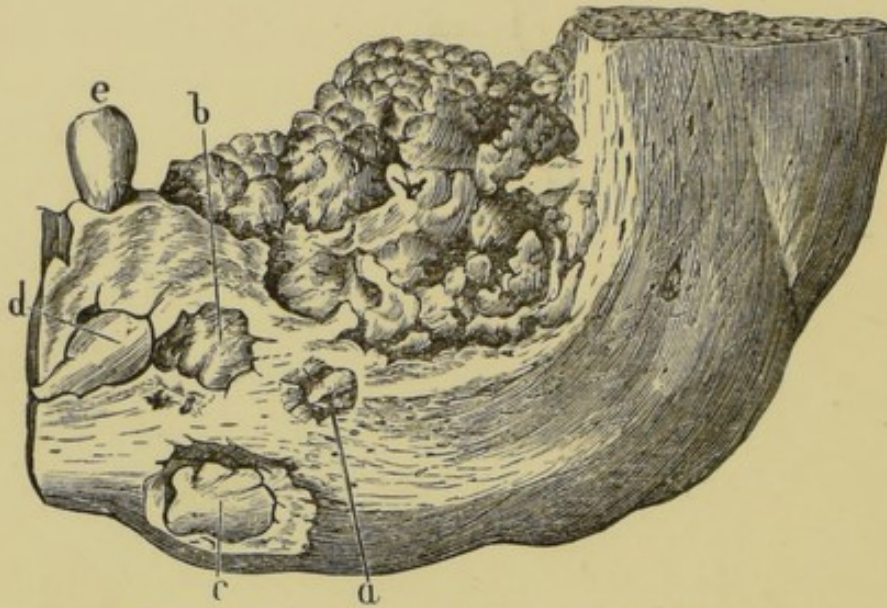


Fig. 33.—Composite Odontome (Forget's case).

a and *b*, portions of the tumour projecting through the bone. *c*. Crown of an inverted molar. *d*. Second bicuspid. *e*. First bicuspid.

papilla and dental sac ; often two or more tooth germs are fused indiscriminately. They differ from the compound follicular odontomes in that the various parts of the teeth composing the mass are indistinguishably mixed instead of forming separate denticles.

Forget's well-known specimen (Fig 33) is usually regarded as an odontome of this kind. It was removed from a man of twenty, in whose lower jaw it had been growing since he was five years old. It formed a round, smooth, hard tumour occupying nearly the whole of the left side of the mandible ; all the teeth behind the first bicuspid were absent. When the portion of jaw shown in the figure was removed, it



was seen to be converted into a cavity occupied by a hard oval substance the size of an egg, composed of an irregular mass of enamel, dentine and cementum. The affected tooth germs were supposed to be the last two molars.

CHAPTER VIII.
- - -

TUMOURS OF THE GUM.

The term "epulis" is used in different ways by different authors. By some it is used to signify a growth situated upon the gum no matter of what nature ; by others it is limited to one variety of growth, viz., a fibrous tumour ; others again define an epulis to be a sarcomatous tumour originating from the bone or periosteum. It is advisable therefore either to discard the term entirely, or else to use it only in its topographical sense, prefixing an adjective such as fibrous, sarcomatous, etc., to indicate the nature of the tumour.

The following tumours are met with on the gum:—

FIBROUS TUMOUR.

A fibrous epulis may grow from the periosteum of the surface of the alveolus or from the periodontal membrane. It is composed of fibrous tissue and is covered by normal gingival mucous membrane. It is usually a small tumour, not much larger than a pea, but may, if allowed to grow unchecked, attain much larger dimensions, so as even to protrude from the mouth. It may be sessile or pedunculated.

When growing from the surface of the alveolus it does not displace the teeth, but when growing from the alveolo-dental periosteum, the neighbouring teeth are frequently separated. Fibrous epulis often occurs in connection with carious teeth, or with the stumps of teeth, and seems to be the result of irritation, but one often sees cases in which the teeth are perfectly normal. The most common situation of this form of growth is between the upper canine and lateral incisor. It is said to occur more frequently in women than in men. It grows very slowly; a tumour the size of a pea may have

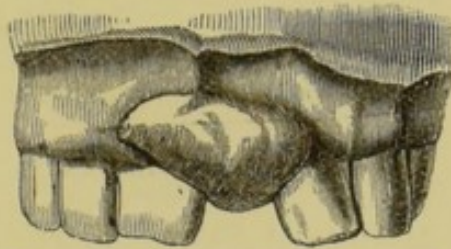


Fig 34.—Fibrous Epulis displacing the adjacent teeth. (*Heath.*)

been noticed for a year or more. It does not recur after complete removal. It is painless unless it is large enough to come in contact with the opposing teeth, in which case it is apt to become ulcerated and give rise to a good deal of pain.

FIBRO-SARCOMA.

Many examples of the common form of epulis contain spindle-shaped and round cells, as well as fully formed fibrous tissue. They resemble the fibrous epulides in their situation and general characters, but differ from them in their microscopic structure (as already stated) and in the facts that they are somewhat softer, grow rather more quickly and have more tendency to recur after removal. They often contain spicules of bone.

MYELOID SACROMA.

A myeloid epulis consists of a stroma of fibrous or fibro-cellular tissue, embedded in which are a number of multinucleated giant cells. It is identical in structure with the myeloid sarcomata which grow from the interior of the ends of long bones. Although myeloid epulides project upon the gum they grow from the bony alveolus and not from its periosteal covering like the fibrous and fibro-sarcomatous epulides. They are much rarer than the ordinary epulides and are more vascular and therefore softer; they are of a dark maroon tint, and are often mottled with purplish spots; they occur in young subjects and grow rather quickly, and show a decided tendency to recur unless they are very freely removed.

VASCULAR TUMOURS.

This name is given to a variety of epulis which is composed of fibrous tissue containing a large number of dilated thin-walled blood vessels mostly venous in nature. These tumours are most often met with in the incisor region, and may grow from the gum, from the periodontal membrane, or from the alveolus itself. In some cases they appear to be in connection with decayed teeth, whilst in others they have no connection at all with the teeth. They usually begin as a small bright red spot which grows slowly, forming either a sessile tumour which passes between the teeth, or a little pedunculated growth which hangs from the gum; they are very soft and compressible, of a bright red or dark purplish colour according to the nature of their vessels, very prone to bleed when damaged by a tooth brush or hard pieces of food, more especially when the surface is ulcerated;

occasionally they pulsate synchronously with the action of the heart. They are innocent tumours and do not recur after removal.

PAPILLOMA.

Papillomata of the gum are rare. It is not customary to apply the term epulis to this variety of tumour. They consist of an overgrowth of the papillæ of the gum and resemble papillomata of other parts of the body in their microscopic structure, being composed almost entirely of epithelial cells supported by a fine fibrous substructure. They may grow from any part of the mucous membrane covering the jaws. They are usually pedunculated; their surface may be more or less smooth, or may resemble a small piece of cauliflower, or may be surmounted by long shreddy processes like enormous filiform papillæ.

They are innocent tumours, but occasionally in old people they may become epitheliomatous, especially when exposed to continual irritation.

EPITHELIOMA.

Epithelioma of the gum occurs as an ulcer more often than as a definite tumour, it is therefore undesirable to include it under the "epulides." In structure the growth resembles squamous epitheliomata of other parts.

The onset of the disease is very insidious and apt to escape recognition; it begins as a small ragged ulcer usually close by a diseased tooth which has been a long-continued source of irritation to the gum. After removal of the offending tooth the ulcer does not heal as it would were it of a simple nature but tends to increase both towards the cheek and towards the tongue. Induration of the base of the ulcer soon occurs, but

owing to the natural hardness of the gum it cannot be appreciated until the ulceration has extended to the soft tissues of the cheek or tongue. As the ulcer increases in size its edges

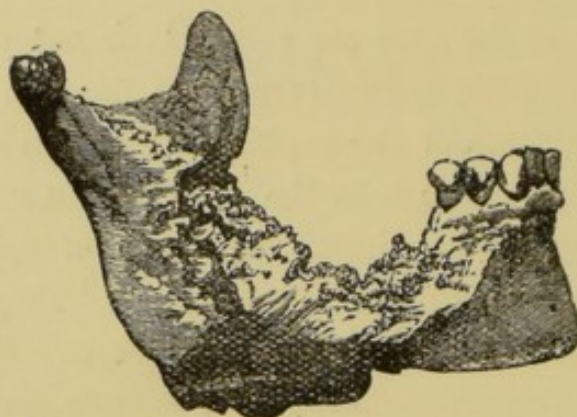


Fig. 35.—Epithelioma of the Gum causing extensive destruction of the Jaw.

(*Museum of the Royal Free Hospital.*)

become ragged and everted and its surface foul and sloughy. Before long the lymphatic glands at the angle of the jaw become enlarged, hard and fixed. The breath is foetid, mastication very painful, and there is profuse salivation; ultimately cachexia supervenes and the patient dies from exhaustion.

Diagnosis and Treatment of Tumours of the Gums.

It will not suffice to make a diagnosis of "epulis;" that there is a tumour on the gum will be at once evident on inspection. The important point to decide is the nature of the tumour, as upon this decision the prognosis and treatment must depend.

It is not always easy to distinguish between a purely fibrous epulis and one in which there is an admixture of sarcomatous elements until a section of the tumour has been made and

examined under the microscope. One must be guided by the rate of growth and the consistency of the tumour ; the longer it has been growing and the harder it is to the touch the more likely is it to be purely fibrous and, conversely, the more rapid its growth and the softer its consistence, the more likely is it to prove sarcomatous.

A simple fibrous epulis should be cut away with the smallest amount of damage to the surrounding parts. It will usually suffice to remove it with a knife or a small gouge. The adjacent teeth unless obviously decayed and in close connection with the growth should not be interfered with ; it often happens that a permanent cure can be effected without the sacrifice of a tooth.

If from the rapidity of growth and soft consistency of the tumour it is suspected to contain sarcomatous elements, or if recurrence has taken place after previous removal, then more radical means must be adopted. Not only must the whole tumour be removed, but a thin layer of bone must also be taken away from the site from which the tumour springs. If the growth originates from or involves the alveolo-dental membrane the tooth must be extracted, and the alveolus cleared out with a gouge. When the growth is large and sarcomatous in nature it may be necessary to remove the whole thickness of the alveolus ; this may be accomplished by making a vertical saw cut on each side of the growth, and detaching the piece of bone carrying the growth by means of cross-cutting bone forceps. In those rare cases in which the size of the tumour necessitates an external incision it should be made in the middle line of the lip, the resulting scar being scarcely perceptible. The lower border of the jaw should

always be saved if possible so as to preserve the contour of the face.

Vascular tumours of the gum are easily recognized by their colour and by their great tendency to bleed. They may sometimes be cured by repeated applications of powdered tannin, but the most satisfactory treatment is to excise them and to arrest the subsequent hæmorrhage by applying the actual cautery.

Papillomata should be excised.

The early diagnosis of epithelioma of the gum is a matter of great importance, for it is only whilst the disease is still small that there is any hope of effecting a permanent cure. Any chronic ulcer on the gum in a person beyond middle life should be regarded as malignant if it fails to heal after the removal of all sources of irritation such as rough teeth or badly fitting plates. In doubtful cases the diagnosis may be settled by removing a small piece of the edge of the ulcer and examining it microscopically. The treatment must be effective and must be carried out without delay if the patient's life is to be saved. No time must be wasted in applying caustics, but the growth must be very freely excised, removing at the same time a wide area of healthy tissue. It will always be necessary to remove the whole *thickness* of the jaw, and very often the whole *depth* as well. Before proceeding to operate the surgeon should make up his mind that he has a fair chance of removing the whole disease; an incomplete operation is worse than useless.

CHAPTER IX.

TUMOURS OF THE PALATE.

Tumours of the palate are not common, but they are of many different kinds. They present a general resemblance to tumours of the salivary glands. They are more common in the soft palate than in the hard and on the left side than on the right. Most of them grow slowly, are painless and quiet, and therefore often unnoticed for many years.

The following account is based mainly on Mr. Stephen Paget's paper in the 22nd vol. of the St. Bartholomew's Hospital Reports.

DERMOIDS.

Dermoid tumours are occasionally met with in the middle line of the hard or soft palate. They vary in size from that of a hazel nut to that of an orange ; they are often pedunculated. In some cases the tumour is solid and is covered with skin bearing hairs and sebaceous glands, and in others the tumour forms a cyst the inside of which is lined by skin. In one recorded case the tumour was no less than eight inches long and five or six broad and protruded from the mouth of a newborn child causing great impediment to respiration. The tumour contained rudimentary limbs and generative

organs and four inches of intestine, as well as nodules of bone and cartilage.

Small pedunculated dermoids may be easily ligatured and removed. The larger tumours may necessitate a very formidable operation.

EPITHELIAL PEARLS.

Epithelial pearls are minute bodies consisting of concentric laminae of horny epithelium : in some the epithelium forms onion-like layers without any tendency to cornification.

They are very commonly found in new-born children, situated in the middle line and near the posterior margin of the hard palate, in the alveolar processes, and on the anterior surface of the gums; they are also found in other parts of the body at the lines of reflection of epithelial surfaces.

They are produced by the retention and subsequent moulding of shed epithelium in the recesses of sebaceous glands, in mucous crypts or in folds of epithelial-covered surfaces. According to Bland Sutton those pearls found in the middle line of the palate are the result of inclusion or sequestration of portions of epithelium in the process of fusion of the palatine processes of the two maxillæ, but Kanthack has shown that they are due to ingrowths of epithelium resembling the enamel organ and can always be traced to the surface. It is possible that the small supernumerary teeth sometimes found lodged in the mucous membrane over the meso-palatine suture are formed in this way.

Epithelial pearls are only of pathological interest ; they produce no symptoms and do not require treatment.

CYSTS.

Cystic tumours of the palate are very rare. In addition to the dermoid cysts already alluded to, a few cases have been observed in which dental and dentigerous cysts have made their way towards the hard palate producing a fluid tumour in that situation. Jourdain has recorded a case of blood cyst occupying all the left half of the palate.

VASCULAR TUMOURS.

Tumours composed of dilated veins like nævi have been observed on the palate, they are of a purple or livid tint, and of a soft doughy feel; they have a tendency to bleed, and may vary in size from time to time.

Aneurysms of the posterior palatine artery have occasionally been met with. In most cases they have been the result of injury. Electrolysis is the best means of curing these tumours.

POLYPI.

Polypoid growths of the palate are delicate out-growths of connective tissue attached by a slender pedicle either to the uvula or to the soft palate. Sometimes they are symmetrical. They do not occur on the hard palate. Their surface is covered by stratified epithelium and is finely wrinkled, or roughened with minute filiform papillæ like those of the tongue; their lymph spaces are well developed and their blood vessels large.

They are commoner in men than in women, and are very seldom met with in childhood. They may exist for years without producing any symptoms and may be only found out by accident. Sometimes they produce a tickling at the back of the throat and repeated efforts at swallowing.

They should be snipped off with scissors.

PAPILLOMATA.

Papillomata are more common on the soft palate than on the hard, but sometimes they may extend over the whole palate.

In microscopic structure they resemble other papillomata ; sometimes they are pedunculated, and sometimes they are sessile or attached by a short broad pedicle. They often grow without discoverable cause, but are sometimes of syphilitic origin. The symptoms are the same as those of polypoid tumours.

They should be removed with knife or scissors ; the bleeding which follows removal may be very free but can be controlled by pressure or by the actual cautery. Caustics are of little or no use.

ADENOMATA.

The term adenoma as applied to tumours of the palate has a clinical rather than a pathological significance. It means a tumour slow in growth, innocent in nature, firm, limited, and, as a rule, shelling out easily.

Adenomata are equally common in men and in women. They occur about puberty and between the ages of forty and fifty. They are much more common in the soft palate than in the hard. Their growth is extremely slow and they produce so few symptoms that they usually remain a long time without giving any trouble or even without being noticed.

They are rounded or oval with their long diameter from before backwards. They are usually elastic, sometimes so much so as to give the impression that they are fluid, but sometimes they are hard and tough. The mucous membrane covering the tumour may be thinned from pressure, but it

very rarely adheres or ulcerates; it generally remains healthy, freely movable and unbroken over the growth.

The structure of these tumours is extremely complex; they contain masses of epithelial cells without any very definite shape or arrangement, part being developed into gland tissue, part breaking down into irregular tracts of a hyaline granular material and part forming cell nests or epithelial pearls. Blended with the epithelial structures is a quantity of embryonic connective tissue, myxomatous tissue, or fully formed fibrous tissue.

Treatment. Adenomata can nearly always be enucleated. For this purpose sufficient anæsthesia can often be obtained by injecting a 2 per cent. solution of cocaine under the mucous membrane. The mucous membrane should then be incised, taking care not to wound the tumour itself. If the growth is in the soft palate enucleation is greatly facilitated by passing a finger into the naso-pharynx and pushing the soft palate and the tumour forwards; hæmorrhage may be stopped by continued pressure.

SARCOMATA.

The sarcomata found in the palate are mostly of the round-celled variety. They are rarer than the adenomata; they occur with equal frequency in men and in women, and more often in the soft palate than in the hard. They are most often met with in persons of forty or older, and do not occur in young subjects. They grow much more rapidly than the adenomata. They are malignant, although the degree of malignancy varies. Some are distinctly encapsuled, whilst others are devoid of capsule. Those tumours which extend downwards into the region of the tonsil are more malignant

than those which advance forwards lying *in* the soft palate, and *on* the hard palate ; the latter are more likely to be encapsuled.

Treatment. If the tumour be not very large, not of rapid growth, and not adherent to the tonsil or pharynx, it should be removed by enucleation. But if the tumour is of more rapid growth, and extends far back towards the tonsil and pharynx, a much more extensive operation will be required, very likely necessitating tracheotomy and ligature of the carotid. In such a case the surgeon must carefully consider the case in all its aspects, and must not embark on such a severe operative procedure unless there is a reasonable hope of removing the whole disease.

CARCINOMATA.

Carcinoma of the palate is a rare disease. There are two varieties, viz., squamous epithelioma, which begins in the surface epithelium, and medullary carcinoma which begins in the deeper parts of the mucous membrane. Squamous epithelioma usually begins in the gum and invades the palate secondarily (see Epithelioma of the Gums). Sometimes it ensues upon long standing psoriasis or warty disease of the palate. The disease presents the same characters as epitheliomatous ulceration elsewhere, the glands are affected early and extensively, and death ensues in a short time.

The medullary form of carcinoma differs from that just described in that a distinct tumour is formed which soon adheres firmly to adjacent structures, grows rapidly and ulcerates in its centre. It is even more rapidly fatal than epithelioma.

It is only seldom that these formidable tumours are seen

early enough to give the surgeon a chance of performing a successful operation. A happy result can only be hoped for when the disease is diagnosed very early, and very freely removed.

CHAPTER X.

TUMOURS OF THE MAXILLA.

Some of the tumours of the maxilla have already been described in the pages dealing with Odontomes, Tumours of the Gum, and Tumours of the Palate. The following pages will be devoted to a description of the remaining tumours of the maxilla, including those found within the antrum.

CYSTIC DISEASE OF THE ANTRUM.

Small cysts about the size of a pea or a marble are sometimes discovered in the interior of the antrum in dissecting room subjects; they have probably caused no symptoms during life. Similar cysts when larger or more numerous may distend the antrum and produce swelling of the face.

According to Giraldès, these cysts result from dilatation of the glandular follicles of the mucous membrane. They contain at first a clear viscid fluid, but later the fluid becomes flaky from the presence of cholesterine, or may become purulent.

Cystic distension of the antrum was formerly designated "hydrops antri" on the supposition that the antrum became distended with mucus owing to blocking of the ostium maxillare.

The symptoms of cystic distention of the antrum are almost identical with those of dental or dentigerous cysts growing into the antral cavity and it is but rarely that a certain diagnosis can be made until the antrum has been opened and explored. When suppuration occurs the symptoms are those of empyema of the antrum.

Treatment. The antrum should be opened through the canine fossa and the cysts scraped out. During the healing process the cavity must be kept clean by syringing with suitable antiseptics.

POLYPUS OF THE ANTRUM.

Polypi of the antrum are somewhat rare. They closely resemble nasal polypi in structure, and the same doubt is entertained in both affections as to whether the tumour is of inflammatory origin or a true new growth. They are well supplied with blood vessels and consequently bleed readily when interfered with. In some cases they are semi-malignant or may be the forerunners of malignant disease.

Polypi of the antrum do not often give rise to definite symptoms of their own. They are most often discovered when the antrum has been opened and explored on account of prolonged suppuration. Sometimes, however, they grow to sufficient dimensions to cause distension and absorption of the walls of the antrum and encroach upon the neighbouring cavities, especially the nose. The treatment consists in removing the polypi through a large opening in the canine fossa and scraping away the diseased mucous membrane with which they are connected.

FIBROMA.

Fibromata of the upper jaw may spring from two situations, viz., the periosteum of the alveolus and that lining the interior of the antrum. Fibroma of the alveolus has already been described under Tumours of the Gum. It is probable that many cases described in the older works as fibroma have really been instances of fibrous odontomes which have escaped recognition. Fibromata arising within the antrum grow very slowly, but if allowed to remain may attain a considerable size and may cause much damage to the surrounding parts; the walls of the antrum become absorbed and displaced allowing the tumour to escape from the antrum and to project into the orbit, into the nose, into the mouth, into the zygomatic fossa and under the cheek.

ENCHONDROMA.

Enchondromata of the maxilla are very rare. They occur in young subjects and may grow either on the surface of the bone or inside the antrum. They are of slow growth and innocent in nature, although sometimes recurrence may take place after removal. They are very hard and usually nodulated on the surface; on section they present close-set nodules or masses of cartilage partly and irregularly ossified and intersected by more or less fibrous tissue. They may attain a great size and produce distension and destruction of the maxilla and other facial bones in the same manner as fibromata.

Some of the enchondromata formerly described were probably examples of chondrifying sarcomata.

OSTEOMA.

True osteomata of the maxilla are very rare tumours. Many cases hitherto described as such have been examples of leontiasis ossea, hard odontomes and ossifying sarcomata. Irregular outgrowths of bone are sometimes met with on the alveolar border, but they are of no clinical importance.

NEUROMA OF INFRA-ORBITAL NERVE.

Bland Sutton has recorded a case in which a neuroma composed of myxomatous tissue grew from the infra-orbital nerve and invaded the cavity of the antrum. The surface of the tumour was covered with a layer of mucous membrane furnished with ciliated epithelium. The tumour had caused intense suffering.

SARCOMA.

Sarcomata are the commonest and most important tumours of the maxilla. As in other bones they may be central or peripheral. Central sarcomata grow from the cancellous bone between the shells of compact tissue. They may be myeloid or round-celled in structure. Myeloid sarcomata are much rarer in the maxilla than was formerly taught, many cases thus described in our museums and in the older works being examples of fibrous odontomes containing a few osteoblasts, and sarcomata arising in the follicles of developing teeth. They usually grow in connection with the nasal process and occur in young subjects; they are of slower growth and are less malignant than the other varieties of sarcoma. When growing from the alveolar process and projecting on the gum they constitute the "myeloid epulis"

already described. They may also bulge into the antrum, distend its cavity, and absorb its walls like other tumours. In some cases of myeloid sarcoma the blood vessels are so numerous that they cause the tumour to pulsate and give it a structure somewhat resembling erectile tissue; they are known as vascular tumours or vascular sarcomata.

Sarcomata of tooth follicles are composed of round and spindle cells with a few myeloid cells interspersed. They occur only in children and usually involve the germ of the first permanent molar. They are at first encapsuled, but eventually reach the surface, ulcerate and give rise to hæmorrhage. The neighbouring glands may become affected.

Peripheral or periosteal sarcomata may spring from any part of the maxilla. They frequently grow from the periosteum of the antrum, distending its cavity and behaving clinically like a central tumour of bone, although pathologically of periosteal or peripheral origin. They are fairly common on the gums, and rare on the palate. In structure they may be either round-celled or spindle-celled; the latter variety often contains cartilage and bone.

The maxilla may also be invaded by sarcomata starting in the nose, naso-pharynx or orbit.

EPITHELIOMA.

Epithelioma of the maxilla occurs in persons beyond middle life, usually about 45 or 50. It may start in the gum, the palate, or in the interior of the antrum. Epithelioma of the gum and palate has already been referred to.

Epithelioma of the antrum may be primary or secondary, i.e., the disease may start in the antrum, or it may invade the

antrum after having started in the gum or palate. Primary epithelioma is a rare disease: it forms a very vascular tumour of a villous nature which fills the antrum, and rapidly perforates its walls in various directions, causing at the same time a certain amount of distension of the cavity, but not nearly so much as the sarcomata. It may be composed of columnar cells, like those covering the mucous membrane of the antrum, or of spheroidal cells like those lining the mucous glands.

Secondary epithelioma is nearly always of the squamous variety. It is a very insidious disease; no definite tumour is formed, and there is no distension of the antral cavity, but there is extensive and very rapid destruction of its bony walls. The disease is often first discovered on extracting a tooth with a piece of soft growth attached to the roots. The socket does not heal, but soon becomes filled with a fungating mass; it will then be found that the socket is in direct communication with the antrum, and that the latter is extensively diseased. To this disease the name "*épithélioma térébrant*" or "boring epithelioma" is often applied.

In all forms of epithelioma of the jaws the disease is very rapid and the lymphatic glands in the neck are very extensively involved. The size of the lymphatic swelling may be out of all proportion to the primary disease, so much so that the patient is often led to seek advice on account of the glandular swelling, the primary growth being discovered only on careful examination of the mouth. The enlarged glands are at first very hard, but they soon soften to such an extent that they may be mistaken for an abscess.

Diagnosis of Tumours of the Maxilla.

To make a correct diagnosis of tumours of the maxilla is often very difficult, sometimes impossible.

The history of the case must be carefully considered ; the more rapid the progress of the disease the more likely is it to prove malignant.

A careful physical examination must be made ; the points which must be especially noted are the condition of the cheek and the characters of any swelling there may be on the face or inside the mouth, the condition of the hard and soft palate ; the nasal cavity must be examined by means of a speculum and artificial light aided, if need be, by careful use of the probe ; in doubtful cases the finger may be introduced into the naso-pharynx to feel for any extension of growth in that direction. Sometimes the diagnosis may be cleared up in a doubtful case by extracting a tooth, and so either evacuating pus or other fluid, or bringing away a piece of growth which can be submitted to microscopic examination. An examination of the submaxillary glands should not be omitted.

Having made a thorough examination, it is necessary to determine (*a*) whether the swelling is solid or fluid, (*b*) whether it is innocent or malignant, and (*c*) its primary seat.

(*a*) In cases of distension of the antrum by fluid the uniform enlargement of the cavity, the elasticity and even fluctuation which may sometimes be detected on palpation may suffice to make the diagnosis, but whenever there is any doubt on this head the antrum should be perforated with a small trocar introduced into the most prominent part of the swelling. It has happened that experienced surgeons have

made the incisions necessary for removal of the maxilla and have then found out that the supposed malignant growth was nothing more than an abscess.

(b) So long as the tumour is confined within the antrum much difficulty will be experienced in determining whether it is innocent or malignant, but when a malignant tumour has passed beyond the cavity of the antrum it grows with great rapidity, insinuates itself extensively amongst the bones of the face, creeps through fissures and foramina and encroaches on the orbital and nasal cavities. Obstruction to nasal respiration and repeated attacks of epistaxis are suggestive of malignant disease. Early and extensive infiltration of the lymphatic glands points to epithelioma; in sarcoma they frequently escape infection.

(c) When the tumour occupies the interior of the antrum the buccal, nasal, palatine and orbital walls are expanded and the line of the teeth is often disturbed, but when the tumour springs from the malar bone, the teeth and palate are unaffected, the swelling being limited to the face and the sulcus between the cheek and the gum; when the tumour springs primarily from behind the maxilla it pushes it bodily forwards without deforming the outline of the bone itself, but it sometimes happens that such a tumour may find its way into the antrum and behave as one originating in that cavity.

Treatment of Tumours of the Maxilla.

The treatment of tumours of the Gum and Palate, of Cystic and Polypoid disease of the Antrum and of the various forms of odontome affecting the maxilla has already been discussed. Innocent tumours such as fibromata, enchondromata, and osteomata may when small, be removed *from* the maxilla;

when growing from the surface they may be cut off together with the piece of bone to which they are actually attached, or when growing from the antrum they may enucleated after opening that cavity freely. Large innocent tumours require removal *with* the whole or a large portion of the maxilla.

Malignant tumours nearly always necessitate removal of the entire maxilla, although occasionally the disease is sufficiently limited to enable the surgeon to spare the malar bone or the orbital plate. Thorough and complete removal of the tumour is necessary; no partial or piecemeal operation is permissible.

Before attempting removal of the maxilla the surgeon should satisfy himself as far as possible as to the diagnostic points mentioned on page 104. He must also determine whether the growth he has to deal with is one that can be removed with a fair prospect of success. No definite rules can be formulated, each case requiring separate consideration on its own merits. When the tumour is of many months duration, hard, well defined, limited to the maxilla, and the skin over it freely movable even though thinned from pressure or altered in colour, it may be regarded as one favourable for removal. If on the other hand the growth of the tumour has been rapid, its consistency soft and ill defined, its vascularity great, the skin over it involved and fixed, the orbit, nose, naso-pharynx or temporal region invaded, the submaxillary and cervical glands enlarged, the patient old, weak, or emaciated, the case must be considered unsuited for operative interference.

COMPLETE EXTIRPATION OF THE MAXILLA.

Before the operation the face must be shaved and the mouth rendered as aseptic as possible. If time permits, carious teeth

should be attended to and those covered with tartar carefully scaled ; the mouth should be frequently rinsed with an antiseptic mouth wash and mopped out with a 1-in-4000 solution of biniodide of mercury immediately before the operation. If the patient is old or feeble it is advisable to administer an enema of hot brandy and water.

The administration of chloroform (the only suitable anæsthetic for the operation) must be entrusted to an assistant

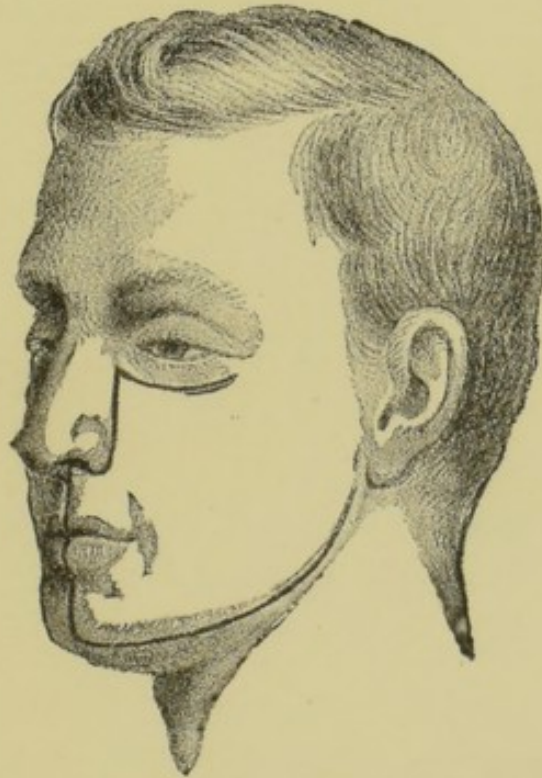


Fig. 36.—Showing the incisions for removal of the maxilla and mandible. (*Heath.*)

who is thoroughly reliable and accustomed to operations involving the mouth.

When the patient is under the influence of the anæsthetic the surgeon makes a complete examination of the growth to

ascertain its extent and attachment and to decide whether, owing to its vascularity, it is desirable to perform a preliminary laryngotomy and plug the pharynx.

An incision is then made through the centre of the upper lip, round the ala and along the side of the nose as far as the inner canthus of the eye, and then outwards as far as the malar prominence. (Fig. 36.) This incision has the



Fig. 37.—Fergusson's Saw.

advantage of dividing the branches of the facial nerve and artery near their terminations, and of leaving a much less conspicuous scar than other incisions which have been recommended. The flap thus marked out is rapidly reflected and the hæmorrhage, which is often very free, arrested with pressure forceps.

The ala of the nose is then detached from the bony margin and the periosteum raised from the floor of the orbit.

With a saw, such as that shown in fig. 37, a deep groove

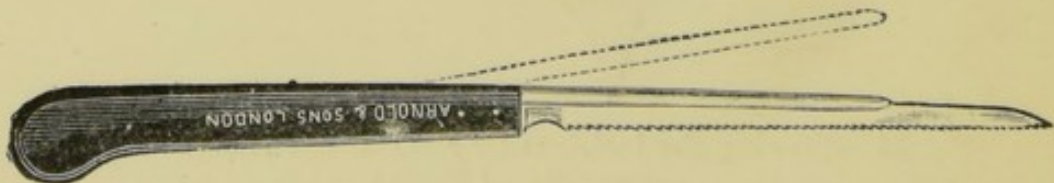


Fig. 38—Narrow-bladed saw with movable back for dividing palate.

is cut in front of the attachment of the masseter muscle partially severing the maxilla from the malar bone; the saw-cut should come opposite the speno-maxillary fissure.

The nasal process of the maxilla is then partially divided in the same way. The central incisor on the diseased side is next extracted and a narrow-bladed saw, (Fig. 38) inserted into the nostril; the hard palate is sawn nearly through, care being taken not to damage the soft palate. The mouth is then opened widely with a gag and the soft palate detached from the margin of the hard with a scalpel, so that when the maxilla is removed the soft palate remains behind. The

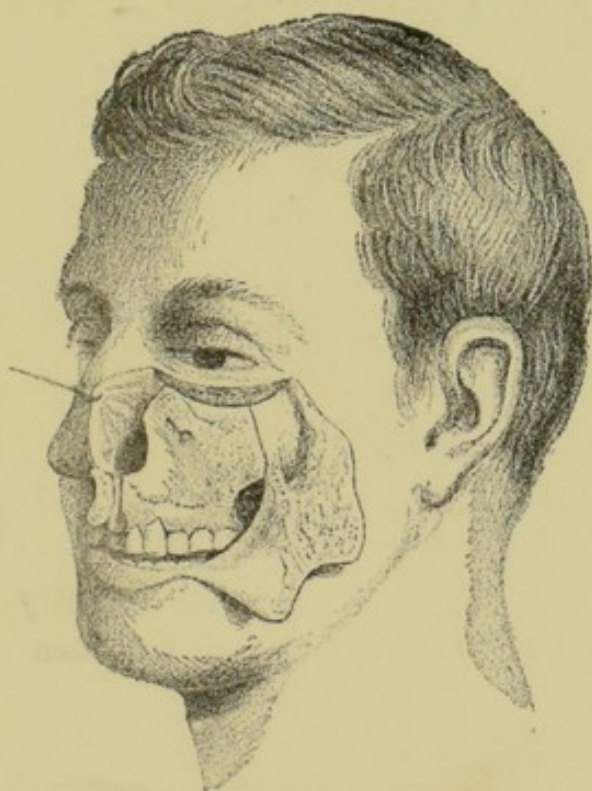


Fig. 39.—Excision of Maxilla. Cheek flaps reflected and the saw-cuts made. (*Heath*).

maxilla is now completely severed from its bony attachments by means of strong cutting bone forceps introduced into the saw cuts previously made. (Figs. 39 and 40).

The loosened bone is then seized with powerful lion forceps

(Fig. 41) and twisted from side to side whilst its remaining attachments to soft parts are torn through with the finger or severed with a knife. The bleeding at this stage is seldom

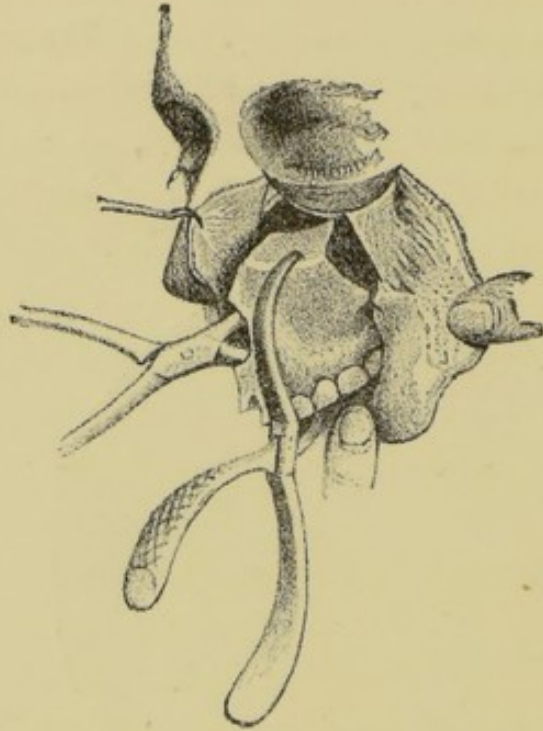


Fig. 40.—Excision of Maxilla. The saw cuts completed by cutting bone-forceps. The Maxilla seized with lion forceps. (*Heath*).

serious as the branches of the internal maxillary artery are small where they enter the maxilla and have been mostly torn

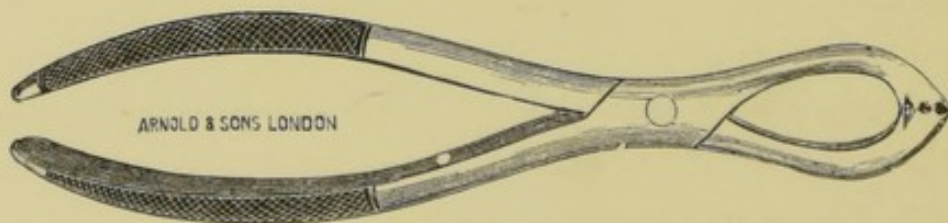


Fig. 41.

across rather than cleanly cut ; it can usually be arrested by sponge pressure, but any vessel which can be seen bleeding

should be tied. The sphenomaxillary fossa and the cavity of the nose are then examined and any further portions of growth left behind are removed by knife, scissors, or sharp spoon. If the surgeon has any doubt as to the complete removal of the disease, chloride of zinc paste should be applied to the suspicious places on the end of a strip of lint and covered with a pledget of wool dusted with iodoform to prevent the escape of the drug into the mouth. If the growth has been completely and satisfactorily removed the wound should not be packed but should be painted over with a solution of iodoform in ether; but if there is any oozing going on after all visible bleeding vessels have been secured the wound should be plugged with strips of iodoform gauze.

The flap having been brought into position, is fixed by a number of interrupted sutures of fishing gut, taking particular care to adjust the red margin of the lip very accurately; hare-lip pins may be used if necessary, but are better dispensed with. The wound is dusted over with iodoform and covered with a gauze dressing.

When the patient has recovered from the anæsthetic, he should be well propped up in bed to facilitate the escape of discharges. Any plugs that may have been inserted, should be removed within 24 hours, and the parts well syringed with weak Condy's fluid, and painted over with the solution of iodoform in ether: the patient should rinse his mouth frequently if he is able to do so, especially after taking food, so that everything likely to favour the growth of bacteria may be as far as possible removed. He must be fed at frequent intervals with small quantities of milk and beef tea administered in a teaspoon if he can swallow, or by the nasal tube

if deglutition is difficult or impossible. The administration of stimulants will depend upon the general condition of the patient. When the parts are soundly healed, the gap in the roof of the mouth must be filled up with a properly adapted obturator and artificial denture.

Result of the Operation. Speaking generally, the results of excision of the maxilla are not satisfactory; the mortality directly due to the operation is about 30 per cent., and only about one patient in every sixteen operated on for malignant disease makes a permanent recovery. This sad result is chiefly due to the operation being too long deferred, owing either to inaccuracy of diagnosis or to an unwillingness on the part of the patient to submit to surgical treatment. The causes of death after the operation may be thus summarized.

(a) Hæmorrhage may prove fatal at the time of operation either by inducing syncope or by obstructing respiration. Secondary hæmorrhage may occur whilst the sloughs are separating; if slight in amount it may be arrested by sucking ice, or by plugging the wound with strips of antiseptic gauze; should these measures fail, the wound must be opened up, and the bleeding vessels secured *in situ*; as a last resort it may be necessary to tie the external carotid artery.

(b) The shock of the operation is always severe, in some cases fatal. Prolonged and severe shock should be treated by the application of warmth, and the administration of brandy per rectum and ether subcutaneously.

(c) Cellulitis and erysipelas are apt to occur when the patient is old or broken down in health from visceral disease, chronic alcoholism, etc. These conditions demand the local use of antiseptics, scarification or incision of the swollen tissues, and a liberal supply of stimulants.

(*d*) Meningitis may result from extension of septic inflammation through the foramina at the base of the skull; practically nothing can be done to ward off the fatal result.

(*e*) Septic broncho-pneumonia is one of the most frequent causes of death; it is due to inhalation of septic matter from the mouth. The importance of rendering the mouth aseptic prior to the operation, and of keeping it so afterwards, has already been insisted on.

(*f*) In many cases recurrence of the disease takes place even before the wound has healed, and as already stated the number of cases which permanently remain free from recurrence is very small.

PARTIAL EXCISION OF THE MAXILLA.

In some cases of innocent tumour of the maxilla it is possible to remove the whole disease without sacrificing the entire maxilla. In some cases the orbital plate may be preserved. In such the skin incision may be limited to the upper lip and the side of the nose, and the bone may be divided below the margin of the orbit by saw or chisel. The preservation of the orbital plate is a great advantage to the patient, since when it is removed there is serious disfigurement of the face, much œdema of the lower eyelid, and the eye itself may lapse into an unhealthy condition, and eventually be destroyed.

When the orbital and nasal portions of the maxilla are involved, and the palate sound, the latter may be preserved. The malar and nasal processes having been sawn through, a horizontal saw-cut is made above the alveolar process from the nose outwards towards the malar incision, and the piece of bone thus isolated prized out with a chisel or elevator, or wrenched away with lion forceps.

CHAPTER XI.

TUMOURS OF THE MANDIBLE.

Tumours of the mandible bear a close general resemblance to those of the maxilla. The same tumours affect both bones, although not with the same relative frequency. The absence of a large central cavity in the mandible, and its isolation from the other bones of the face and skull, render the diagnosis and treatment of its morbid growths simpler than in the case of the maxilla. Were it not for the fact that teeth are implanted in this bone, and that a large portion of its surface is covered by the mucous membrane of the mouth, the tumours of the mandible would be almost identical with those of other bones. The different varieties of epulis and of odontome affecting the mandible have already been described.

FIBROMA.

There are two varieties of fibroma affecting the mandible, viz., the endosteal or central, and the periosteal or peripheral.

Central fibroma. The tumour consists of a hard dense mass of fibrous tissue ; it is most commonly found on one lateral half of the jaw, only rarely at the symphysis ; it may occupy the dental canal. As it grows it expands the bone over it, the outer plate yielding more than the inner. Different views have been held to explain the origin of central fibromata. According to Virchow, they originate from the periosteum of the alveoli, and differ in no way from fibromata of other parts. Heath regards them as being of inflammatory origin ; he thinks that plastic lymph exuded between the plates of the jaw, as the result of dental irritation, may become organized into fibrous tissue, and by continuing to grow form a distinct fibrous tumour. Broca and Bland Sutton regard the majority of these tumours as being fibrous odontomes.

The clinical characters are those of an innocent tumour. The rate of growth is slow, the tumour is hard and smooth, not fixed to the overlying parts, although firmly embedded in the substance of the bone and expanding its plates. There is usually little or no pain and no affection of the general health, unless the tumour has been inflamed or ulcerated from the injudicious use of local applications. Under such circumstances the tumour may rapidly assume enormous dimensions, and may lead to a fatal result by sloughing or by interfering with respiration or deglutition.

The treatment consists in removing the whole tumour with as little of the bony substance of the jaw as possible. Small tumours may be scraped out with a gouge from within the mouth. Larger tumours necessitate an external incision. It is very seldom that the tumour is so large as to necessitate removal of the jaw as well as the tumour.

Peripheral fibromata grow from the periosteum of the bone and usually present upon the gum being identical with the "fibrous epulis" already described.

ENCHONDROMA.

Enchondromata, like fibromata may be of central or peripheral origin. They are composed of nodules of cartilage bound up by intersecting fibrous bands. Clinically the central enchondromata closely resemble fibromata, but they are much rarer tumours. The periosteal chondroma is very rarely a pure cartilaginous tumour, it is nearly always a spindle-celled sarcoma of low degree of malignancy in which extensive chondrification has taken place; it therefore not uncommonly recurs after removal.

The treatment is the same as that of fibromata so long as the tumour is perfectly innocent, but should the clinical history or microscopic examination prove the admixture of sarcomatous elements, it will be wise to remove not only the tumour, but a surrounding area of healthy bone as well.

OSTEOMA.

There are two varieties of osteoma of the mandible, the cancellous and the ivory.

The cancellous osteoma may be the result of ossification of an enchondroma, in which case it forms a distinctly circumscribed tumour lodged in the interior of the bone. As in the case of the maxilla so in the mandible, tumours have been described as osteomata which were really examples of leontiasis, hard odontomes or ossifying sarcomata.

The ivory exotosis grows from the surface of the bone most commonly near the angle. The tumour depicted in

Fig. 42 was removed during life from the mandible of a young woman. For the purposes of illustration it has been mounted on a dried mandible and sketched *in situ*. It grew from the immediate neighbourhood of the mental foramen, and was perforated by the mental nerve. It was composed entirely of compact tissue.

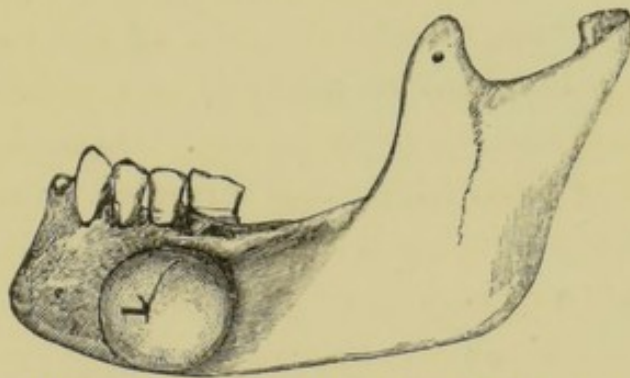


Fig. 42.—Ivory exostosis of Mandible. The bristle is in the mental foramen.

The treatment consists in removal. Cancellous osteomata may be gouged away; ivory exostoses should be sawn off flush with the surface of the jaw.

SARCOMA.

Sarcomata of the mandible may be central or peripheral.

Central Sarcomata may arise in the follicles of developing teeth especially the first molar, (Fig. 43). They may also be of the usual myeloid or round-celled varieties so often met with in other bones. Myeloid sarcomata are not so common as they were formerly supposed to be, cases of fibrous odontome and follicular sarcoma having been included under this class. They present the same naked-eye and microscopic appearance as myeloid sarcomata of the long bones. Clinically they are malignant tumours, but their malignancy is

not great. They occur mostly in young subjects, grow rather slowly and expand the bone evenly. A myeloid sarcoma growing from the interior of the alveolar border may project on the gum forming the myeloid epulis already described.

Round-celled sarcoma is much more malignant than the myeloid. When growing from the interior of the bone it causes rapid expansion and absorption of the plates of compact tissue, so that in a few weeks or months the tumour may fungate into the mouth or on the face. On section it presents a soft granular yellowish surface traversed by narrow bands of fibrous tissue dividing it into indistinct lobules. It nearly always recurs very rapidly after removal.

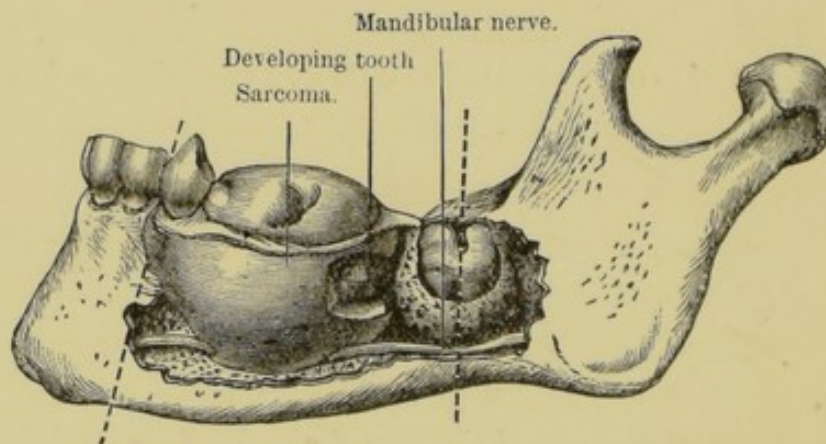


Fig. 43.—Sarcoma of a tooth follicle. The dotted lines show the amount of bone removed. (*Bland Sutton*).

Periosteal Sarcomata may be spindle-celled or round-celled in structure.

Spindle-celled sarcoma is one of the commonest tumours of the mandible. It usually begins as a small swelling on the gum; as it grows the teeth become displaced and loosened from their sockets, and the tumour assumes a lobulated or tuberculated appearance, and varies in colour from a light pink to a dark purple. If the tumour is allowed to grow

unchecked it may assume very formidable dimensions, forcing the mandible downwards and pushing the tongue backwards towards the pharynx causing death by dyspnoea or starvation. The rapidity of growth and the malignancy of this tumour varies a good deal, and depends to a large extent upon its microscopic structure; in some cases the spindle-shaped sarcomatous cells become converted almost entirely into fibrous tissue, cartilage or bone, the degree of malignancy being low in proportion to the amount of fully formed connective tissue; in others the spindle cells retain their embryonic characters, and may be mixed with oval or round cells, such tumours being much more malignant than those in which chondrification or ossification has taken place.

Round-celled sarcoma may grow from the periosteum as well as from the interior of the bone. It is very malignant. Its clinical characters are practically identical with those of the central round-celled sarcoma already described. Chondrification and ossification may take place to some extent, but the tumour is always very malignant.

Sarcomata of the mandible demand thorough removal. In every case the whole growth must be removed, and in most of them a surrounding area of healthy bone must be removed as well. The freedom of removal must be determined by the rapidity of growth, the structure of the tumour (if known) and its position with respect to the bone; it is well known that central sarcomata are less malignant, and therefore require a smaller operation than those of peripheral or periosteal origin.

EPITHELIOMA.

Epithelioma of the mandible presents the same general characters as epithelioma of the maxilla. The disease nearly

always starts in the gum and erodes the jaw secondarily, (Fig. 44), but it sometimes happens that an epithelioma growing in the lower lip, tongue, cheek, or submaxillary lymphatic glands may extend to and involve the mandible.

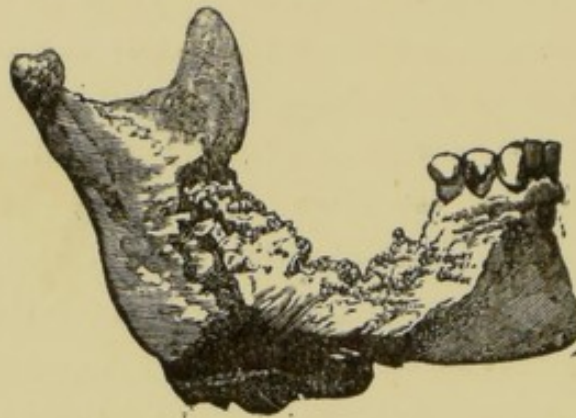


Fig. 44.—Epithelioma of Mandible secondary to Epithelioma of Gum. (*Museum Royal Free Hospital*).

Although the disease usually shows itself as an ulcer, in some cases a distinct tumour is formed; this is particularly the case when recurrence has taken place after the removal of the primary growth.

Early and complete removal is the only treatment that holds out any prospect of success.

Under the name "columnar epithelioma" authors have described the tumour now known to be a form of odontome (the epithelial odontome). This tumour has nothing in common with epithelioma, save that it consists largely of epithelial cells (see chapter on Odontomes).

Diagnosis of Tumours of the Mandible.

The diagnosis of tumours of the mandible is much easier than the diagnosis of tumours of the maxilla. In the

first place it is important to bear in mind the possibility of the tumour in question being some form of odontome, and to remember how rarely these tumours are correctly diagnosed before they have been subjected to operation. Again, it is not always easy or possible to decide whether a tumour occupying the interior of the bone is solid or fluid, and in such cases we must adhere to the rule to cut into the tumour before proceeding to cut it out. With regard to tumours which are without doubt solid, it may be stated generally that those which are of slow growth, hard, and isolated, are innocent in nature, whereas those of rapid growth, soft consistency, ill-defined outline, or having a tendency to fungate or to affect the lymphatic glands, are almost certainly malignant.

Treatment of Tumours of the Mandible.

The treatment of tumours of the mandible is attended with far greater success than that of the tumours of the maxilla. This is chiefly due to the fact that the mandible is comparatively isolated from surrounding parts, and the surgeon is therefore better able to eradicate the disease thoroughly. Moreover, the shock following operations on this bone is comparatively slight.

Small tumours, especially when innocent in nature, may be cut away with bone forceps or enucleated with chisel and gouge without making any external incision; for these operations Wingrave's ingenious gag is particularly useful.

Larger tumours, or those of more malignant nature may require removal of a piece of the jaw in its complete depth and thickness. In such cases the remaining portions of bone should be kept in their relative positions by means of a steel

knitting-needle inserted into the inferior dental canal, as recommended by Stanley Boyd. Hæmorrhage from the inferior dental artery may necessitate the use of Pacquelin's cautery, or the insertion of a small wooden plug into the canal.

Still larger or more malignant tumours can only be effectually removed by excision of one half of the jaw.

REMOVAL OF HALF OF THE MANDIBLE.

The patient is prepared in the same way as for removal of the maxilla. The surgeon, standing on the same side of the patient, makes an incision along the lower border of the jaw as far as the angle and continues it upwards to just below the lobule of the ear ; if necessary the lower lip may be divided in the middle line ; but the red margin should always be spared if possible. The extent of the incision will depend upon the size of the tumour and the necessity (owing to the vascularity of the tumour or the condition of the patient) of operating rapidly. The facial artery having been secured, the flap is turned upwards, the masseter being taken with it if sound, and the mouth opened by dividing the mucous membrane at its attachment to the alveolus. The lower central incisor having been extracted, the bone is divided sufficiently to one side of the symphysis to preserve the attachment of the anterior belly of the digastric ; the division is commenced with the saw and completed with bone forceps. If the extent of the disease necessitates the removal of the genial tubercles, the tongue must be prevented from falling back upon the larynx by passing a piece of silk through its tip. The bone is then drawn outwards and the knife passed close along its inner side so as to divide the mylo-hyoid and

internal pterygoid muscles, and the inferior dental vessels and nerve. The bone is then strongly depressed so as to bring into view the coronoid process and the insertion of the temporal muscle, the tendon of which is divided. If much

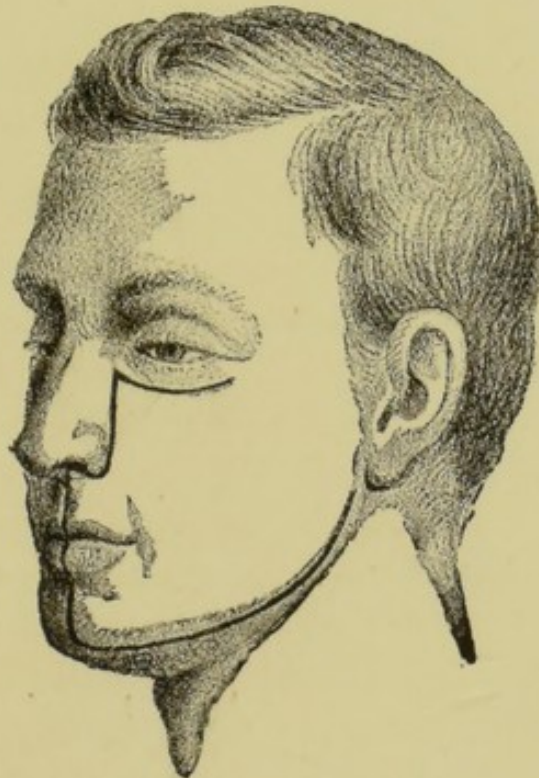


Fig. 45.—The lower line indicates the incision for removal of the Mandible. (*Heath*).

difficulty is experienced at this stage owing to unusual length of the coronoid process, or to its hitching against the malar bone, it may be cut off with bone forceps, and after the removal of the jaw dragged down with sequestrum forceps and removed. After the coronoid process has been freed, the bone is still further depressed so as to bring the condyle into view, care being taken not to rotate it outwards lest the internal maxillary artery be endangered. The fibres of the external pterygoid muscle are then partially torn

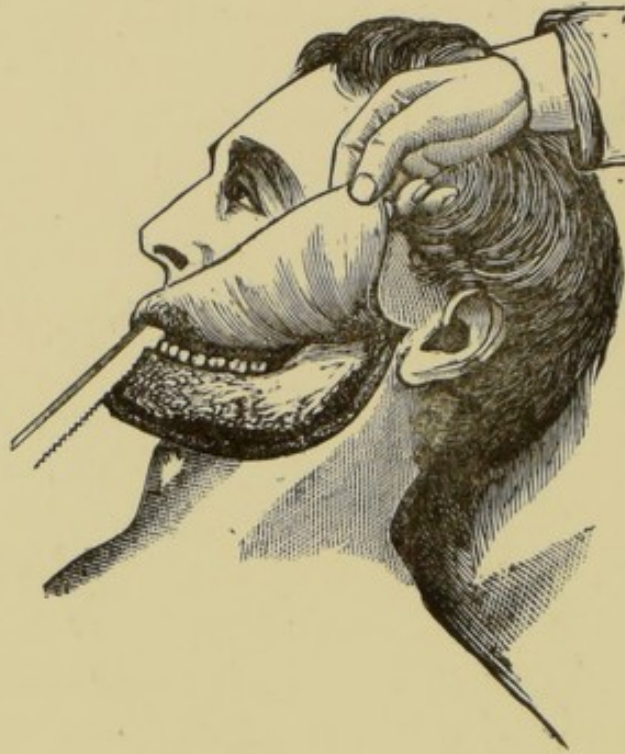


Fig. 46.—Removal of Mandible. The flap raised. The saw applied near the symphysis. (*Erichsen.*)



Fig. 47.—Removal of Mandible. Disarticulation of condyle. (*Erichsen.*)

through by the finger or director, and the joint opened in front by the careful use of the point of the knife. During this stage of the operation if the surgeon be hampered for want of space, the flap may be forcibly dragged upwards with a retractor; the incision should not be carried further upwards as it would necessitate dividing the greater part of the facial nerve. The lateral ligaments having been divided and the remaining fibres of the external pterygoid muscle torn through, the stylo-mandibular ligament is severed and the jaw comes away.

When the jaw has been much thinned by the disease it not unfrequently fractures when depressed to bring down the condyle; the upper fragment is then drawn upwards under the zygoma by the temporal muscle, and the difficulty of the operation is greatly enhanced. Under such circumstances the remaining piece of bone must be seized with lion forceps and dragged down.

All hæmorrhage having been arrested, the wound is carefully examined to see that no disease has been left behind. Any enlarged glands are removed. The flap is then brought into position and fixed with fishing-gut sutures, drainage being provided by inserting a tube in the direction of the glenoid cavity, and bringing the end of it out through the most dependent part of the wound. The latter is then dressed in the same way as after removal of the maxilla.

The gap left after removal of a portion of the mandible is to a large extent filled in by fibrous tissue, but no new bone is formed as the periosteum is always taken away with the tumour. In this respect there is a marked contrast to the extensive repair which ensues after loss of the mandible by necrosis.

CHAPTER XII.

LEONTIASIS OSSEA.

Leontiasis ossea is the name given by Virchow to a curious condition in which the skull and face become greatly deformed by the development of irregular growths of bone. This condition has also been named Diffused Hyperostosis.

The disease usually begins in young subjects. In some cases its onset has been marked by pain and swelling of the face or by other inflammatory symptoms following upon an injury or exposure to cold. In other cases the disease has begun and progressed insidiously, without any discoverable cause. As the bony growths increase in size, the features become hideously distorted, the eyes being displaced and sometimes destroyed by pressure, and respiration and mastication greatly impeded by the invasion of the nasal and buccal cavities. The disease may last for many years, death eventually resulting from emaciation or from some intercurrent affection.

On examining the skull of a patient who has suffered from this condition the bones are found to have become greatly changed. The disease may be of limited extent, perhaps

only affecting one maxilla, or it may involve all the bones of the skull and face. The affected bones present a coarse tuberculated surface and are studded with rocky shapeless outgrowths projecting into the orbits, nasal cavities, and mouth, as well as upon their external surfaces; these outgrowths sometimes assume considerable size forming tumours which may project as much as three inches from the face. In the specimen depicted in Fig. 48 the mandible is scarcely affected, but in some cases it may be so much enlarged that

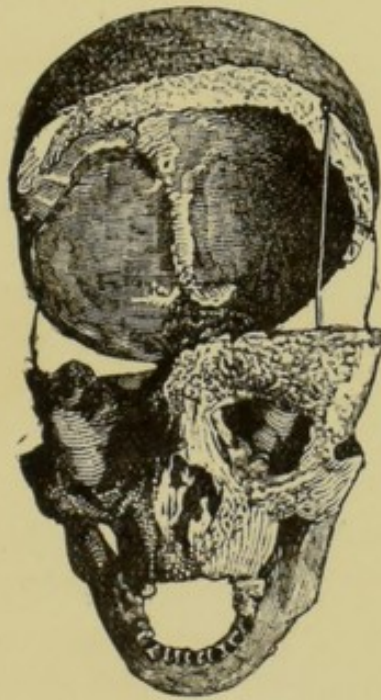


Fig. 48.—Leontiasis ossea. (*Museum of St. Mary's Hospital.*)

its ramus or body measures five inches or more in circumference.

On section the bone is found to be uniformly hard and dense but finely cancellated; the maxillary frontal and ethmoidal sinuses may be completely filled up with bone

so that no trace of these cavities can be found ; the sockets of the teeth may be similarly affected.

Microscopic examination shows two kinds of bony tissue, the one compact and the other cancellous. The compact tissue does not differ much from the normal structure, but the cancellous tissue shows large irregular spaces somewhat resembling primary bone ; there is but little trace of lamination ; the lacunæ are very numerous, and are small and arranged irregularly ; definite Haversian systems are for the most part absent.

With regard to the etiology or pathology of leontiasis nothing is known.

The treatment is very unsatisfactory. Drugs are useless, although some surgeons think that benefit may be derived from the prolonged administration of iodide of iron.

When the disease is of limited extent, affecting only one bone, or giving rise to one or two definite excrescences, the surgeon is justified in removing the affected parts by operation ; but the proceeding must be regarded as palliative rather than curative.

ACROMEGALY.

Acromegaly is characterized by great overgrowth of the hands and feet, and deformity of the face. The legs and forearms are not usually enlarged. The spine often presents a posterior curve in the dorsal region. The skin is thick and sometimes warty, and the hair may be unusually long and coarse. The cranium is often enlarged, especially in its antero-posterior diameter. The jaws, especially the mandible, are nearly always enlarged. In the patient from whom the

accompanying illustrations were taken, the lower wisdom teeth were 2.8 cm. further apart than the corresponding teeth of the upper jaw, and the lower incisors were 1.7 cm. in advance of the upper teeth. The nose is increased in size, the lips are thick, the lower one having a tendency to protrude and hang down; the tongue is large and soft, and presents ridges and furrows on its upper surface.

This disease affects persons of either sex, and has been most often observed between the ages of twenty and forty. The subjects of this disease often complain of headache and



Fig. 49.—Patient affected with acromegaly, showing enlargement of hands, mandible and lips. (*Partsch*).

general lassitude, and the speech is usually thick and slow. In women the catamenia are nearly always suppressed.

The pathology of acromegaly is not at present understood. All the tissues of the affected parts are equally overgrown; in the hands and feet the bones are enlarged as well as the soft parts. In several cases which have been examined post mortem the pituitary body has been found enlarged, atro-

phied or affected by a new growth, and pathologists are inclined to think that disease of this body is an essential factor in the production of acromegaly; in some cases the

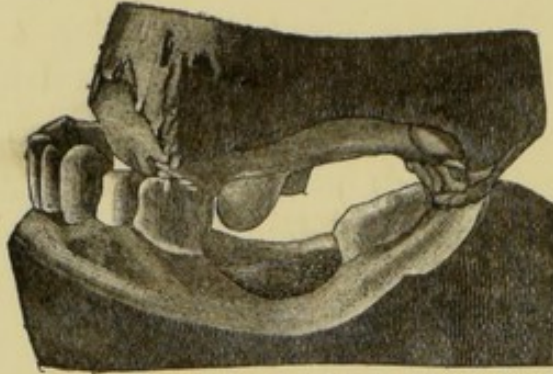


Fig. 50.—Cast of the Jaws of patient shown in preceding figure.
(*Partsch.*)

thyroid gland, thymus or sympathetic nerves have been diseased, but it is not known at present whether these conditions are causal or casual.



Fig. 51.—From the same patient showing enlargement of tongue.}]
(*Partsch.*)

No treatment is of any special use.

OSTEITIS DEFORMANS.

This is a very chronic form of inflammation of bone, occurring in old people. The affected bones become increased in size and bent. The disease affects the bones of the cranium and the long bones; those of the face and of the hands and feet are unaffected. The distribution of the disease is therefore in a sense complementary to that of acromegaly, from which it may be readily distinguished. Nothing is known as to its cause, and no treatment hitherto used has been found to do any good. The disease is briefly noticed here to distinguish it from leontiasis and acromegaly.

CHAPTER XIII.

ACTINOMYCOSIS.

Actinomycosis is a disease which results from the introduction into the body of a vegetable organism called Actinomyces. This organism appears to grow naturally upon barley or corn, and for this reason the disease is much more common among cattle than in man. Actinomycosis of the tongue and jaws of cattle has been long known to veterinary surgeons, but it is only during the last fifteen or twenty years that its pathology has been understood, and its occurrence in man recognized. The manner in which the parasite enters the body varies in different cases ; sometimes particles of barley or corn have been found at the seat of affection. In man the disease may begin in the mouth, in the intestines, in the lungs or in the skin. Wherever the parasite establishes itself in the body it gives rise to inflammation and the formation of a large amount of granulation tissue. In some cases the granulation tissue becomes converted into fibrous tissue forming a definite lump or tumour. In other cases the inflammatory process goes on to suppuration, abscesses are formed and discharged, and a fungating mass of granulation tissue and parasitic growth protrudes on the surface.

Although the parasite may lodge in almost any part of the

body, the jaws are the structures most frequently affected. The parasite usually gains access to the pulp of a carious tooth and gives rise to a train of symptoms resembling those of alveolar abscess. The inflammatory swelling slowly increases, so that in a few weeks a definite tumour has formed. When the maxilla is affected the tumour bulges at some part of the cheek; when the mandible is the seat of the disease the swelling is most often found at or near the angle of the bone. The tumour, which is fixed to the jaw, is at first hard and subsequently softens so that fluctuation may be obtained. Eventually the swelling bursts on the face or into the mouth, discharging a turbid serous fluid in which are suspended very characteristic small yellow granules consisting of masses of the parasite.

On passing a probe into the sinuses bare bone can be readily detected. The skin and subcutaneous tissues of the face and neck become diffusely infiltrated and the submaxillary lymphatics may inflame and suppurate. The progress of the disease is accompanied by a certain amount of febrile disturbance, the temperature varying with the freedom of the discharge. After a longer or shorter time the prolonged suppuration leads to emaciation or even to lardaceous disease. In some cases the disease assumes a pyæmic form and metastatic deposits take place in the internal organs. As a rule the disease is chronic lasting one or two years, but in some cases death occurs in a few months. The prognosis seems to be worse when the maxilla is affected than when the mandible is the seat of the disease.

On examining the mandible after death or after removal, it is found to be expanded and hollowed out by a number of cavities opening on the surface by large cloacæ. (Fig. 52).

These appearances are best seen after the bone has been macerated to remove the soft parts. In the recent state these cavities are filled up with a soft honeycombed whitish mass, composed of granulation tissue and parasite. On microscopic examination the granulation tissue is found to contain a number of small radiate masses which are minute colonies of actinomyces. The centre of each colony (Fig. 53) is composed of extremely fine interlacing threads and small round bodies resembling cocci; the periphery is composed of club-shaped



Fig. 52.—Macerated mandible from an animal affected with actinomycosis. (*Museum Royal Free Hospital.*)

bodies which are the enlarged bulbous ends of the threads. The club-shaped bodies are the most characteristic feature of the parasite, but they are not an essential part of it, being probably only the swollen and degenerated ends of the thread or filaments (so called involution forms). The threads are best seen in pus (Fig. 54). They are long and delicate; they often branch dicholomously and contain a number of round bodies like cocci. They are the actively growing and essential part of the parasite. Actinomyces has been cultivated outside the body and the disease has been reproduced by injecting the artificial cultures into animals, thus proving that the parasite is the cause of the disease.

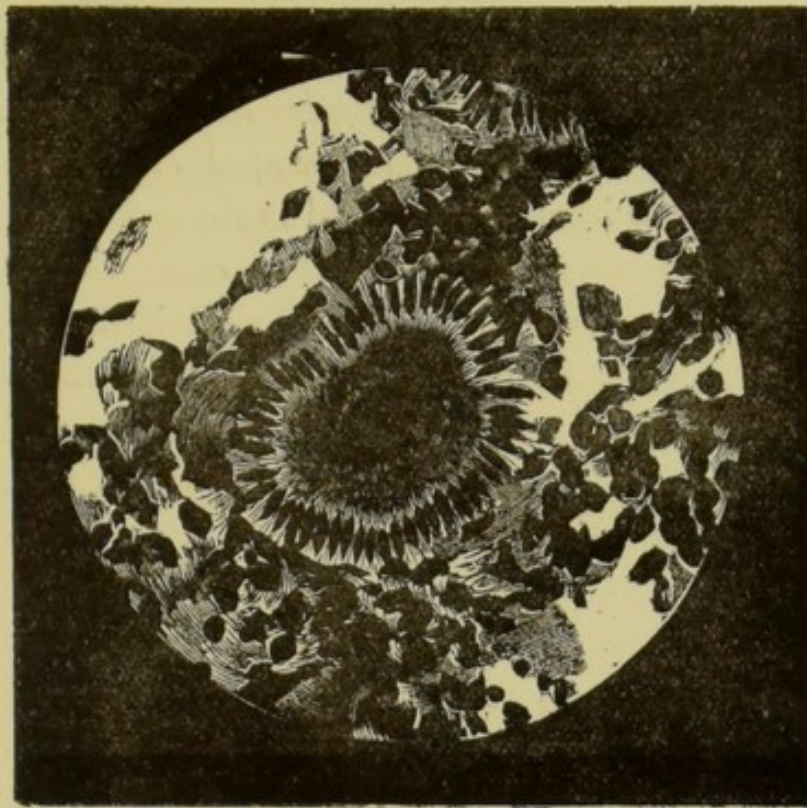


Fig. 53.—Actinomyces in granulation tissue, showing rays and clubs.
(From a Photo-micrograph.)



Fig. 54.—Mycelial form of Actinomyces in pus.
(From a photo-micrograph)

Treatment.—As soon as the diagnosis is established a free incision must be made into the affected parts, and all the soft granulation tissue thoroughly scraped or gouged away, the cavity in the bone being treated in the ordinary manner. Iodide of potassium in large doses has a marked effect on the growth of actinomyces and should be prescribed more especially if it is found impossible to eradicate all the diseased tissues surgically.

CHAPTER XIV.

DISEASES OF THE TEMPORO-MAXILLARY JOINT.

The temporo-maxillary articulation is liable to the same diseases that affect other joints, although not with the same absolute or relative frequency. The following are the most important affections.

ACUTE NON-SUPPURATIVE ARTHRITIS.

This may result from injury, gonorrhœa, rheumatism, or syphilis. The synovial membrane is the structure most affected, the condition resembling synovitis of other joints. The chief symptoms are pain and swelling in the region of the joint and inability to open the mouth. The pain may radiate to the ear or temporal region. The masseters and temporal muscles are contracted and hard. After two or three weeks the acute symptoms subside and the joint may return to its normal condition, or may remain more or less stiff from the formation of adhesions inside or outside the synovial cavity.

Treatment.—The cause of the joint disease must be treated with suitable remedies, and the joint must be kept at rest by the application of an elastic bandage. The food should be entirely fluid, so that mastication may be suspended. After

the acute symptoms have subsided an effort should be made to prevent the formation of adhesions by the use of counter-irritation over the joint, by passive movement of the jaw and massage.

ACUTE SUPPURATIVE ARTHRITIS.

This condition may be due to a wound of the joint, or it may occur in the course of pyæmia, scarlet fever or measles ; in these cases the trouble starts in the joint itself. In other cases suppuration may extend to the joint from neighbouring parts, such as the ramus of the jaw or the middle ear ; in the latter case the pus finds its way into the joint through the Glaserian fissure.

The symptoms are in the first instance the same as those of non-suppurative arthritis, but on the advent of suppuration the local symptoms become greatly intensified, and are attended by febrile disturbance. The pus has but little tendency to reach the surface, being bound down by firm fibrous structures ; it is prone to burrow deeply and may find its way into the ear through the Glaserian fissure, into the skull through the floor of the glenoid cavity, or amongst the tissues of the neck causing in some cases thrombosis of the internal jugular vein. The most important point in the *treatment* is to evacuate the pus as soon as possible by the use of the knife.

RHEUMATOID ARTHRITIS.

Rheumatoid arthritis of the temporo-maxillary joint presents very similiar features to those observed in other joints. It may attack young subjects, especially delicate females, or persons over fifty who are already suffering from the disease in other parts. It may affect one or both sides.

The structures composing the joint are greatly changed. The cartilages become worn away, leaving the articular surfaces of the bone uncovered. The inter-articular fibro-cartilage often disappears entirely quite early in the course of the disease. The articular surface of the condyle becomes flattened and worn away, and is usually roughened; it is only rarely that it displays the eburnated or porcellanous appearance so often seen in other joints. The neck of the condyle becomes absorbed, so that in some cases the mandible may look almost as if its condyle had been taken off with a saw. In some cases the condyle becomes greatly hypertrophied causing the symphysis to deviate towards the opposite side of the face; it is thought by some that this condition, although usually the result of rheumatoid arthritis, may sometimes occur in persons who are otherwise healthy. The glenoid cavity is often enlarged, encroaching upon the eminentia articularis; its depth is usually diminished by an irregular deposit of bone, and its surface is denuded of cartilaginous covering. No marked changes in the synovial membrane or ligaments have been observed or recorded.

The symptoms are pain and creaking on movement, stiffness of the joint, some general fulness, and in rare cases, when the condyle is enlarged, marked deformity. In the later stages of the disease, movement of the joint may be so restricted that the patient can only open the mouth to a very limited extent, and is quite unable to masticate food. *Treatment* is very unsatisfactory, the disease being in most cases incurable. Relief may sometimes be obtained by the use of small repeated blisters, hot sponging, keeping the joint covered so as to protect it from cold, and the frequent use of passive movements by means of a screw gag; very little

force must be used, or more harm than good will be done. When movement is greatly restricted the condyle may be excised (see Fixity from Ankylosis).

TUBERCULAR ARTHRITIS.

Tubercular disease of the temporo-maxillary joint is a very rare affection. It resembles tubercular disease of other joints. The synovial membrane becomes thickened and succulent, the cartilages eroded, and the articular surfaces carious or necrosed. Complete bony ankylosis may ensue.

The treatment consists in the prolonged use of rest and constitutional remedies. Should these means fail, the diseased structures must be thoroughly removed by operation.

CHAPTER XV.

FIXITY OF THE MANDIBLE.

Inability to open the mouth may be due to three conditions, viz., spasm of the muscles of mastication, ankylosis of the temporo-maxillary articulation, and cicatrices between the two jaws.

FIXITY FROM SPASM.

Spasm of the muscles of mastication may be due to some affection of the central nervous system, such as tetanus; in such cases the closure of the mouth is of no importance as compared with the disease of which it is a symptom. In women it may be due to hysteria.

The most frequent cause is some inflammatory trouble in the neighbourhood of the mandible or temporo-maxillary joint, such as mumps, inflammation of the lymphatic glands or impaction of a lower wisdom tooth. It not unfrequently happens that owing to want of room between the ramus of the jaw and the second molar tooth, or the malposition of the wisdom tooth, the latter is unable to erupt; the pressure which it exerts upon neighbouring parts produces a reflex tonic spasm of the masseter and internal pterygoid muscles,

As a rule the spasm subsides as soon as the source of irritation is removed, but in some cases the inflammatory condition arising around the tooth spreads to the adjacent muscles, setting up a myositis which may result in permanent contraction.

Spasmodic closure due to an impacted wisdom tooth is most common about the age of twenty, but may occur in much older persons, in whom eruption of this tooth has been delayed. Spasmodic closure may last a long time (in one recorded case as long as two years) and may be immediately relieved by removing the cause of irritation.

Treatment.—The mouth must be opened by means of a screw gag, whilst the patient is under the influence of chloroform. The wisdom tooth should then be extracted, or the second molar should be removed so as to allow room for it to erupt.

FIXITY FROM ANKYLOSIS.

Inflammatory affections of the temporo-maxillary joint may lead to a varying degree of stiffness, or impaired movement. The stiffness may depend upon adhesions outside the joint, fibrous ankylosis of the articular surfaces, or in more severe cases (especially those following upon suppurative arthritis) actual bony ankylosis. If the stiffness is dependent upon fibrous adhesions a certain amount of movement is obtainable either by the voluntary effort of the patient or by the use of the screw gag when the patient is under the influence of chloroform. In cases of osseous ankylosis the jaw is absolutely fixed.

Treatment.—In recent cases of stiffness from external adhesions or from fibrous ankylosis, an attempt may be made

to restore movement by the forcible use of the screw gag. It is, however, but seldom that any permanent benefit results. Should this method of treatment fail, two other courses are open to the surgeon, viz., subcutaneous division of the adhesions and excision of the condyle.

The division of adhesions is performed by passing a very narrow tenotomy knife into the joint immediately in front of the temporal artery and carrying it freely round the condyle completely dividing the external lateral ligament, and partially the insertion of the external pterygoid muscle. The depth of the incision must be carefully measured to avoid wounding the middle meningeal artery. The immediate result of the operation is very good, but relapse is very likely to ensue.

The most satisfactory treatment is excision of the condyle. This may be effected through the mouth as practised by Dr. Mears, but it is best done from without by the following method. An incision $1\frac{1}{2}$ inches long is made along the lower border of the zygoma. The parotid gland and branches of the facial nerve being drawn down, the masseter fibres are cleared away from their insertion, and the joint exposed. The neck of the condyle is then divided with a saw, trephine or chisel, the condyle turned out with an elevator, and the attachment of the external pterygoid muscle severed. The fibro-cartilage is left behind. After the operation the mouth should be opened at least an inch, and this proceeding must be repeated at frequent intervals so as to prevent the tendency to relapse.

FIXITY FROM CICATRICES.

Cicatrices binding the two jaws together may result from ulcerative or gangrenous stomatitis, mercurialism, necrosis,

alveolar abscess, compound fractures, lacerated wounds, and surgical operations upon the face or jaws.

The constricting bands may be limited to the mucous membrane, or may involve the tissues of the cheek being attached to the bone, and forming a firm bond of union between the two jaws. In a few cases the two jaws have been united by a buttress of bone, or the coronoid process has been found glued to the inside of the zygoma as the result of osteoplastic periostitis.

Treatment. Attempts to stretch the cicatrices by mechanical means are not often successful, and the division of bands inside the mouth is usually futile. Attempts to cover the wounds, made by excision of scars, with flaps of mucous membrane or skin are "difficult, bloody, and disappointing." The best result is obtained by performing Esmarch's operation. This consists in removing a wedge-shaped piece of the jaw, so as to form a false joint in front of the cicatrix. An incision two inches long is made along the lower border of the jaw in front of the masseter and cicatrices. A triangular wedge of bone is then removed with a narrow bladed saw or bone forceps. The wedge should measure $1\frac{1}{4}$ inch below and $\frac{3}{4}$ inch above, its apex corresponding to an edentulous gap in the alveolar border if possible. Passive movements should be employed early and persisted in until there is no tendency to relapse.

When only one side of the mouth is affected this operation restores the power of mastication as well as of opening the mouth ; when it is necessary to operate on both sides, the function of mastication is necessarily lost, although in this respect the patient is no worse off than before the operation.

CHAPTER XVI.

STOMATITIS.

Stomatitis signifies inflammation of the mucous membrane lining the cavity of the mouth. In some cases the submucous tissue is also affected. The inflammation may be more or less limited to the gums (*gingivitis*) or to the tongue (*glossitis*) or may be distributed over more or less of the entire membrane. Stomatitis may be due to many different causes, some local, others general or constitutional.

The inflammatory process may present different features in different cases. It may be catarrhal, phlegmonous, exudative, ulcerative or gangrenous. Very often two or more of these processes occur either simultaneously or consecutively in the same patient, but usually one of them preponderates above the rest. It is best to classify cases of stomatitis according to the nature of the inflammatory process.

CATARRHAL STOMATITIS.

In this condition the mucous membrane becomes congested and serum exudes into the sub-epithelial connective tissue, filters between the epithelial cells and oozes upon the surface. The epithelial cells multiply with abnormal rapidity

and secrete an abundance of mucus, which mingles with the serum exuded from the deeper parts to form the characteristic watery and sticky discharge of mucous catarrh.

Catarrhal stomatitis may be secondary to any of the specific fevers such as scarlatina, measles and small-pox, or to any inflammatory affection of the stomach or intestines. It may be the direct result of any form of irritation such as that produced by rough or carious teeth, food which is too hot, too cold or too highly seasoned, excessive use of alcohol or tobacco, and in children the process of teething, etc. It may also be due to the internal administration of mercury or iodine.

The mouth is usually painful, especially when food is taken. At first it is dry and hot, but afterwards there is an excessive secretion of viscid mucus. Taste is perverted, impaired, or lost. The mucous membrane is red and swollen; the tongue is indented by the teeth and covered with a thick coating of fur, and its papillæ are red and swollen; the gums are swollen and of a deep bluish-red tint, and covered with a greasy secretion; the ridges behind the upper incisor teeth are swollen, reddened and tender. The disease usually runs its course in a few days, but may be more protracted if the exciting cause is allowed to remain.

Treatment. The cause must be discovered and removed. The diet must be limited to fluid or soft solid substances such as milk, soup, eggs, etc., and should be cold or luke-warm. An aperient is usually required.

The mouth should be frequently rinsed with a one or two per cent. solution of chlorate of potassium. Children who are too young to rinse the mouth should have it cleansed with cold water after each meal, and then painted over with

a solution of borax (grs. 50 ad ℥i) or boracic acid (gr. x ad ℥i).

PHLEGMONOUS STOMATITIS.

In this condition there is diffuse inflammation of the sub-mucous connective tissue of the mouth. Exudation of serum and lymph takes place into the meshes of the connective tissue leading to considerable swelling. The inflammation may undergo resolution, or may proceed to suppuration resulting either in the formation of localized abscesses or a diffuse purulent infiltration. Septicæmia or pyæmia may ensue.

The most frequent cause is injury, such as that caused by foreign bodies, or by blows forcing the cheek against the teeth ; in such cases the wound becomes infected by some of the mouth bacteria. It may also result from extension of erysipelas of the face to the buccal cavity, or it may be secondary to typhoid or scarlet fever.

The disease is attended by considerable febrile disturbance and interference with the functions of the stomach and intestines. Speech and mastication are difficult and painful, and there is an excessive flow of saliva. The affected part is greatly swollen and tender to the touch ; at first it feels hard, but subsequently becomes soft and can be indented by the finger. If the mouth can be opened sufficiently, the mucous membrane is seen to be red and swollen, and if there is a wound upon its surface it will look sloughy and unhealthy. Localized softening may indicate the formation of pus which sooner or later becomes discharged into the mouth.

When the tongue is the part affected, it swells rapidly, becoming too large for the mouth, and protrudes between th

teeth, or presses against the back of the throat, causing great dyspnoea ; sometimes the swelling is limited to one half of the tongue.

Treatment. The swollen parts must be deeply scarified. When the tongue is affected great relief is afforded by making a longitudinal incision on each side of the dorsum. In other respects the treatment resembles that of catarrhal stomatitis.

EXUDATIVE STOMATITIS.

The characteristic feature of this kind of stomatitis is the presence of exudation (usually in the form of vesicles or pustules) upon the surface of the mucous membrane. Such vesicles and pustules may occur in the course of some of the specific fevers such as small-pox. In diphtheria a croupous exudation may form on the buccal mucous membrane, similar to that found on the pharynx. For an account of these conditions a work on medicine should be consulted.

There are two varieties of exudative stomatitis which require description here, viz. *herpetic* and *aphthous*.

Herpetic vesicles may form on the palate, cheek or tongue, but are commonest on the lips, at the junction of skin and mucous membrane. *Herpes labialis* often occurs in association with pneumonia, rheumatic fever, influenza, acute nasal catarrh, and other febrile conditions. It may also be caused by local irritation, such as that produced by highly seasoned food, strong tobacco, etc.

The disease may effect either the upper or the lower lip ; sometimes both. It begins as a crop of blisters varying in size from a pin's head to a pea ; they develop very rapidly, and are at first clear and transparent, but after a few days become dim, assuming a greyish-white or greyish-blue colour ;

their contents may become purulent. They are usually surrounded by a slight halo of redness. After a few days they shrivel up and form scabs. When the disease affects the mucous membrane the characteristic vesicles are not often seen because the elevated epithelial covering is macerated and shed in a short time, giving rise to superficial excoriations having a yellowish base and red swollen edges.

The *treatment* consists in administering a mild aperient when the vesicles are situated on the skin, they may well be left alone, but when on the mucous membrane they should be cleansed with a solution of borax or boracic acid.

Aphthous stomatitis is characterised by the occurrence of small flat whitish or cream coloured spots or erosions. They may result from the bursting of vesicles, suppuration of mucous follicles, or from small hæmorrhages in the mucous membrane. These spots may occur on any part of the buccal mucous membrane. They cause considerable pain and great sensitiveness of the mouth in eating, speaking, or smoking. Young children refuse their food and become poorly nourished. The *treatment* is similar to that of herpetic stomatitis.

ULCERATIVE STOMATITIS.

Ulceration of the mucous membrane of the mouth may occur to a slight extent in the varieties of stomatitis already described. It may also occur in syphilitic and tubercular affections of the mouth; these will be considered separately. In this section three varieties of ulcerative stomatitis will be dealt with, viz., *mercurial*, *scorbutic* and *ideopathic*.

Mercurial Stomatitis results from the absorption of an excessive amount of mercury into the system (see mercurial necrosis). The mucous membrane becomes reddened and

inflamed, especially the gum in the region of the lower incisors. The teeth appear lengthened and mastication is painful. The secretion of saliva is greatly increased and the tongue swells so that it may protrude from the mouth. The gums become swollen and spongy and retreat from the necks of the teeth; they bleed readily. The mucous membrane of the cheeks and gum becomes coated with a whitish grey membrane, on removing which deep irregular ulcers are exposed. If the disease persists the ulceration penetrates deeper and deeper until it involves the jaw producing periostitis and necrosis.

The *treatment* consists in removing the source from which the system has become impregnated with mercury. The mouth must be cleansed by washes containing chlorate of potassium or boracic acid. After the acute symptoms have subsided, the ulcers may be painted with tannic acid (grs. 50 ad ℥i) or with a solution of carbolic acid in tincture of rhatany (grs. 5 ad ℥i). The elimination of mercury from the system may be hastened by administering small repeated doses of iodide of potassium.

Scorbutic Stomatitis is one of the local manifestations of scurvy. It begins with pain, especially on mastication, and salivation. The gums become swollen and bluish-red, and project over and between the teeth; they are usually more or less ecchymosed, and sooner or later become ulcerated. The ulcers are irregular and covered with a dirty brown exudation, they bleed readily and copiously and emit a foetid odour. Similar ulcers may form on the cheeks, tongue and lips. The teeth may become loose and fall out.

The *treatment* consists in alleviating the disease by providing suitable food, especially fresh fruit and vegetables.

The local treatment is the same as that of mercurial stomatitis.

Ideopathic Stomatitis occurs chiefly in children especially those who are ill fed, strumous or ricketty, or those who live under unhealthy conditions. It is supposed by some to be contagious. It usually begins acutely by swelling and softening of the gum which becomes covered by a yellowish greasy putrid mass. When this mass is separated an ulcer is exposed spreading along the edge of the gum and bleeding readily. The cheek opposite the interval between the teeth is often affected in the same way. There is always profuse salivation, and the breath is very offensive. Pain may be severe or quite absent. The general health is as a rule not much affected, and fever is slight or absent.

The *treatment* resembles that of the other varieties of stomatitis. Chlorate of potassium is particularly useful. It should be given in full doses, a child of four years taking 30 grains a day.

GANGRENOUS STOMATITIS.

Gangrenous Stomatitis (noma) occurs in sickly children living amongst unhealthy surroundings and more especially during convalescence from the specific fevers such as measles and scarlet fever.

It usually begins as an ulcer on the inner aspect of the cheek near the angle of the mouth. The cheek becomes swollen, brawny, red and shining. In the middle of the inflamed area there is a livid spot; this soon turns into a black slough, and is surrounded by a purplish mottling; it spreads with great rapidity and often involves the whole side of the face. The inside of the cheek is lined with tough

adherent greyish-yellow or soft purplish slough. When the disease starts upon or involves the gums, the latter become red, spongy and ulcerated ; the ulceration extends rapidly and is accompanied by the formation of dirty-looking sloughs ; the teeth become loosened and fall out, and the jaw is laid bare. The saliva is much increased in quantity and is mingled with blood and pus ; the breath is most offensive. There is, as a rule, very little pain and but slight fever ; there is marked apathy, and the vital functions are greatly depressed. The disease nearly always leads to a fatal termination, death being due to some form of septic poisoning such as broncho-pneumonia.

The *treatment* must be prompt and energetic. All the affected tissue must be carefully dried and then thoroughly swabbed with fuming nitric acid. The patient's strength must be supported with fluid nourishment, tonics and stimulants.

CHAPTER XVII.

SYPHILITIC AFFECTIONS OF THE MOUTH.

The mouth may be affected in all three stages of syphilis.

Primary syphilitic sores are by no means rare upon the lips. They have also been observed upon the tongue, on the tonsil and on the gum. These erratic chancres are usually circular and distinctly elevated above the surrounding mucous membrane, and are often indurated; the neighbouring lymphatic glands are much enlarged and very hard, often forming a mass of considerable size in which the shape of the individual glands can be readily made out. Primary chancres in unusual situations often assume extraordinary characters which are so diverse as to admit of no terse description. In such cases the correct diagnosis is apt to be missed unless the possibility of syphilis is suggested; it is therefore a good rule in practice to suspect that any sore of peculiar appearance and which defies diagnosis may be a primary chancre; the diagnosis can then be easily confirmed by the co-existence or subsequent appearance of signs of secondary syphilis.

In secondary syphilis the most important lesions are the mucous tubercles or plaques and the ulcers to which

they give rise. The favourite seats of mucous patches are the lips, the angles of the mouth and the edges of the tongue; they are also seen on the cheeks, the gums and the hard and soft palate. The appearance of mucous patches varies considerably, and depends upon the amount of irritation or damage to which they are subjected by the teeth, etc. They are best seen in their unaltered condition on the dorsum of the tongue near the circumvallate papillæ or on the under surface of the tip. A typical mucous patch is round or oval in shape, of a greyish white colour, and raised above the level of the surrounding parts; its border is sharply defined and usually somewhat sinuous or wavy. The surrounding mucous membrane presents a perfectly natural appearance. The surface of the patch may be quite smooth or it may be intersected by cracks or fissures; sometimes it may assume a warty or cauliflower-like appearance. In situations where the patches are exposed to injury (for instance, on the edges of the tongue and the inside of the cheek near the teeth) the appearances differ greatly from those just described. The outline of the patch whilst roughly retaining its oval form becomes much more sinuous and is surrounded by a red areola about an eighth of an inch in breadth. The surface of the patch becomes ulcerated and grooved, or marked by alternate red and white lines. The entire tubercle is not usually destroyed, but the central part breaks down producing a sinuous ulcer surrounded by a pearly-white rounded smooth border. If the patient be in bad health, and if the irritation be continued the ulcer may extend and assume formidable dimensions. Mucous patches and ulcers may remain unaltered for a considerable time unless efficiently treated, but they sometimes disappear spontaneously. They are usually sensitive and give

rise to pain in eating, speaking, or smoking; there may be slight salivation, but an offensive odour is very seldom noticed.

In the tertiary stage of syphilis gummata may develop in various parts of the mouth; they are rare in the mucous membrane of the cheeks, and are hardly ever seen in the floor of the mouth, but they are fairly common on the hard palate, where they are particularly prone to break down into round or oval ulcers involving the bone, and leading to perforation (see Syphilitic Necrosis). Gummata are more often met with in the tongue than in any other part of the mouth; they may occur in the mucous membrane or in the muscular substance. When occurring in the former situation they are usually small and multiple, being about the size of a small shot or pea, and feeling hard to the touch and somewhat ill-defined in contour; the epithelium over them may be natural, or if they are very superficial, may be smooth owing to the papillæ getting rubbed off. So long as they are not irritated, they are painless and apt to escape notice, but when irritated they inflame and break down leaving small superficial ulcers. When numerous these ulcers may cover a large portion of the surface of the tongue, giving it a fissured and furrowed appearance; they are very chronic especially when inadequately treated. When they heal they pucker the surface of the tongue causing great disfigurement.

The deep or parenchymatous gummata may occur in any part of the muscular substance of the tongue, but are nearly always found on the dorsum, especially near the centre. They may be quite small, or as large as a walnut. They produce rounded or oval tumours not very well defined, very indolent and causing little or no pain. As they mature they

approach the surface and soften ; the mucous membrane over them becomes smooth and red, and eventually perforated by a small circular aperture which quickly enlarges by melting away of its edges until a deep cavity with ragged sloughy sides is exposed. The size of the ulcer is only fully appreciated when its sides are separated by the finger.

The *treatment* of syphilitic affections of the mouth necessitates the administration of internal remedies suitable to the stage at which the disease has arrived. In primary and early secondary syphilis a course of mercury must be prescribed ; one of the most satisfactory preparations is the hydrarg. cum creta in doses of $2\frac{1}{2}$ grains three times a day. In cases of late secondary or early tertiary syphilis the administration of mercury must depend upon the severity of the disease, the presence or absence of syphilitic manifestations in other parts of the body, and the amount of mercury the patient has already taken in the earlier stages. In tertiary affections iodide of potassium is essential. It should be given at first in doses of 5 grains thrice daily, the amount being gradually increased up to 30 grains three times a day, or until the desired effect is produced. In early tertiary syphilis, especially when there is doubt as to the previous administration of mercury, this drug may be advantageously combined with the iodide.

Local treatment is of more importance and attended with greater success in secondary than in tertiary affections. Mucous patches and ulcers should be painted three or four times a day with a camel-hair brush dipped in a solution of ten grains of chromic acid to one ounce of water. Under this treatment they usually disappear in a week or ten days. Various local remedies may be used for tertiary ulcers, but it

is not possible to predict which one will prove most useful ; each must be tried until the most suitable is discovered. The following are those in common use :—nitrate of silver, alum, sulphate of copper, bicyanide of mercury, honey and borax, chlorate of potassium, tannic acid, and Mandl's solution (Pot. Iod. grs. 30, iodine pur. grs. 5, acid carbol. grs. 5, glycerine ζ i).

It is important that all sources of irritation should be removed as far as possible. The food should be plain and unirritating, smoking should be given up, and alcohol used but sparingly and well diluted. The condition of the teeth should be carefully attended to, and the wearing of artificial dentures suspended.

Lastly, it is of great importance to remember that primary and secondary affections of the mouth are highly contagious. Many cases are on record of syphilis conveyed from person to person either by direct contact or indirectly by means of instruments, drinking vessels, etc. ; dentists have acquired syphilis by scratching the finger on the teeth of persons suffering from the disease. It is therefore very important that patients should be cautioned as to the risk of infecting others, and that dentists and others operating on the mouths of infected persons should be scrupulously careful in disinfecting their hands and instruments.

TUBERCULAR AFFECTIONS OF THE MOUTH.

Tubercular disease of the mouth is comparatively very rare. It may affect the tongue, the cheeks or the hard and soft palate. The tongue is the part most frequently, and often exclusively, affected. The disease may be *primary* or *second-*

ary. Primary tubercular ulcers of the tongue are very rare indeed, but ulceration secondary to tubercular affections of the lungs and larynx are much more common. Tubercular ulcers of the tongue may commence by the breaking of a small vesicle, by the formation of a small yellow point or patch, or in an abrasion caused by rubbing of the teeth. They may occur on any part of the tongue, but are most often seen on the tip and borders. The fully developed ulcer has no characteristic shape; it is usually roughly oval with sinuous borders, uneven pale granulated surface covered by dirty yellow viscid mucus, and sharply cut or bevelled edges. The ulcer is sometimes surrounded by a number of very small greyish-yellow points, or elevations, or, if they have broken down, minute ulcers.

The ulcer is at first not very painful, but as the disease advances it becomes more and more painful and sensitive to touch. Salivation is well marked in the later stages. As time goes on the sore increases, and the patient's strength fails. Sloughing may occur. The glands under the jaw are often, but not always, enlarged. The natural termination of the disease is in death from exhaustion and pulmonary disease. Occasionally a tubercular ulcer heals, at any rate temporarily.

Treatment. Primary tubercular ulcers should be excised whilst they are still small, and if possible before they have infected surrounding parts. In such cases there is a possibility of a permanently good result. Even in secondary tubercular ulcer excision may be practised, if it is of small size and the patient in sufficiently good condition to stand the operation. In such cases the operation is advised not with a view to cure, but to save the great suffering which the ulcer itself causes. The cautery is sometimes used for the removal of

these ulcers, but it has no advantage over the use of scissors.

In cases unsuitable for operation great care should be taken to remove all sources of irritation, and mastication must be rendered as easy as possible by due selection and preparation of the food. It is sometimes even necessary to resort to the use of nutrient enemata, owing to extreme pain in taking food by the mouth. All local applications should be non-irritating. Most benefit will result from the use of cocaine painted on the surface of the ulcer, or of a powder composed of iodoform (gr. i.), borax (gr. iii.) and morphia (gr. $\frac{1}{6}$). blown upon its surface after cleansing with absorbent cotton wool.

The constitutional treatment resembles that of other tubercular affections.

CHAPTER XVIII.

PARASITIC AFFECTIONS OF THE MOUTH.

Animal parasites have been observed in the mouth; cases of echinococcus, cysticercus, trichina spiralis, and dracunculus (guinea-worm) have been recorded, but they are so rare that it is only necessary to refer to them in passing.

The vegetable parasites are infinitely more common and important. It is well known that every mouth, whether healthy or diseased, contains an enormous number of bacteria and that the fur on the tongue is composed almost entirely of minute vegetable organisms. It is also admitted that most of the inflammatory affections of the mouth already described are to a very great extent due to the action of micro-organisms.

But there are certain other conditions in which the growth of a vegetable parasite constitutes in itself the chief morbid feature apart from any effect it produces on the tissues of the mouth. These conditions will now be described.

THRUSH.

Thrush occurs most commonly in children who are brought up by hand, but it is sometimes met with in adults who are prostrated by serious diseases such as typhoid fever, pneumonia, &c.

In children the disease is ushered in with general malaise which lasts a few hours or days ; the mucous membrane of the mouth becomes redder than usual, and in a short time small white patches appear on the lips, cheeks, and tongue, and, sometimes, on the gums. They are circular and at first discrete, looking like pieces of curd, but as they increase in size they coalesce, forming a continuous layer extending sometimes over the whole tongue, lips, cheeks, palate and tonsils. The disease may extend to the pharynx and œsophagus, but does not involve the larynx or trachea. At first the patches adhere closely to the mucous membrane, and can only be detached with difficulty, leaving uncovered deep red areas which bleed readily. After a day or two they become drier, of a yellower colour and more readily detachable. Finally they assume a brownish tint and fall off spontaneously.

During the formation and extension of the patches the child feels ill ; it refuses the bottle or the breast ; the bowels are usually relaxed, the stools being green and offensive. The anus and buttocks become red and excoriated and patches resembling those in the mouth may form ; they are due not to direct spread of the disease through the whole alimentary canal, but to inoculation of the sore places with spores contained in the fæces.

The course which the disease runs, and the severity of its effects upon the patient depend upon the conditions by which

the child is surrounded. In private practice the disease is comparatively trivial, whereas in foundling hospitals (especially in former times when the importance of cleanliness was under-estimated) the disease has been attended with a high mortality, the children becoming exhausted by enteritis and continual diarrhoea.

A microscopic examination of the white patches shows them to be composed almost entirely of a fungus known as the *saccharomyces albicans* or *thrush fungus*. This organism was formerly known as *oidium albicans*, but recent experiments have shown that it is a bud-fungus, not a mould-fungus. The thrush-fungus consists of cells of various shapes, some being elongated and cylindrical, others oval or spherical, these latter being more abundant on the surface of the membrane; in the deeper parts of the membrane and in the epithelium the cells elongate into thick mycelial threads. The fungus attacks chiefly stratified epithelium; it very seldom attacks mucous membranes covered with cylindrical epithelium.

The fungus may gain access to the mouth in several ways. It may be inspired, it may be directly inoculated from the vagina during parturition, or it may be taken in with the food, especially with milk which has undergone partial fermentation. The disease very rarely occurs in children brought up at the breast with ordinary cleanliness.

The *treatment* of thrush is simple and effectual when the child is surrounded by proper hygienic conditions, but under other circumstances is difficult and unsatisfactory. All vessels and implements used for containing milk, or for feeding the child must be thoroughly cleansed as soon as they have been used. The milk must be quite fresh and should be sterilized before use. If possible the child should be put to

the breast of a healthy nurse. The patches of membrane should be detached with a soft rag dipped in weak Condy's fluid. Borax may be used, but without the addition of syrup, as the latter aids the development of the fungus. In severe cases a weak solution of nitrate of silver (2 grains to the ounce of distilled water) may be used to paint the patches twice a day, borax being frequently used in the intervals.

NIGRITIES OR BLACK TONGUE.

In this condition a black patch forms on the dorsum of the tongue and slowly spreads. After lasting some time (a few weeks or months) it may disappear spontaneously. It is due to the growth of a parasite (*Glossophyton*) probably closely allied as *Aspergillus nigricans*.

The affection does not give rise to any symptoms beyond a feeling of dryness in the mouth. It is usually discovered accidentally.

It should be treated by suitable antiparasitic remedies.

PHARYNGOMYKOSIS BENIGNA.

This condition consists in the development of soft white spots or tubercles on the base of the tongue near the epiglottis, sometimes on the tonsils and pillars of the fauces. The spots consist of masses of *leptothrix buccalis* and other organisms.

They disappear spontaneously. No special treatment is necessary.

STOMATOMYKOSIS SARCINÆ.

This condition occurs in wasting diseases such as phthisis or protracted typhoid. It consists in the development of hoar-frost-like membranes on the tongue and soft palate, consisting of *sarcinæ*. It is very rare, and does not call for special attention.

CHAPTER XIX.

DISEASES OF THE TONGUE.

In this section no attempt will be made to give a complete account of the diseases of the tongue. Only those conditions which are of interest and importance to the dental surgeon will be considered.

ULCERS OF THE TONGUE.

The tongue is subject to ulceration from many causes, some local, some constitutional. The frequency of ulceration of the tongue is to a great extent due to the soft structure of its mucous covering and to the many sources of irritation to which it is exposed. The various ulcers of the tongue are best classified according to their cause.

Simple Ulcers. Under this heading are usually included those ulcers which cannot be ascribed to any definite or clearly ascertainable cause; they are probably due to slight injury or irritation which has passed unnoticed. The best example of this class is seen in cases of chronic superficial glossitis where the surface of the tongue is divested of papillæ and covered by a thin bluish-white pellicle broken

up into small areas by lines and fissures. In such cases ulcers are common on the centre of the tongue, being due to sloughing of a small piece of the mucous membrane in the course of an acute attack of inflammation in the seat of old chronic inflammation or scar tissue. The ulcer thus produced soon assumes a chronic character having a smooth, red, glazed surface, callous edges and an irregular or stellate outline. It often causes much pain especially on taking hot food, and is a source of great inconvenience.

The treatment of these ulcers is difficult and unsatisfactory; they may be got to heal, but they have no sooner healed than they break out again either in the same place or in another part of the tongue. All sources of irritation must be avoided; the food should be plain, soft and unirritating; alcohol and tobacco must be given up. Various local remedies may be tried in succession until the most suitable is discovered. Chromic acid solution (ten grains to the ounce) chlorate of potash gargle, honey and borax, and solution of tannic acid, or alum may be tried in turn. Nitrate of silver is often used, but it is seldom serviceable, indeed often harmful, especially when used in strong solutions.

Dyspeptic Ulcers usually occur on the tip of the tongue, but may extend some distance back towards the centre. In some cases the tip and adjacent portion of the dorsum are red and raw, the condition being one of excoriation rather than actual ulceration; the filiform papillæ are absent, the fungiform papillæ looking larger than natural. Behind the excoriated area the tongue is thickly furred. In other cases definite ulcers result from the breaking of vesicles or pustules situated about the tip of the tongue. When they break they leave small, circular, well-defined ulcers with sharp-

cut edges, varying in size from a pin's head to a split pea ; their surface may be clean and red, or covered with a thin slough. They are very tender, and, as they are almost constantly in contact with the teeth, they occasion a good deal of pain and inconvenience. The treatment is in most cases limited to the administration of an aperient ; they usually heal in a few days. If they are more obstinate or show a tendency to recur, the diet must be regulated, the bowels kept open, and the ulcers painted with chromic acid solution, or rinsed with chlorate of potash gargle.

Apthous ulcers occur particularly in children between the ages of six months and three years, often as a sequela of measles or scarlet fever. (See Aphthous Stomatitis).

Traumatic ulcers may follow a wound produced by the teeth or by any other cause; they usually heal readily and require no special treatment beyond cleanliness. The most important ulcer of this class is the *dental ulcer*. It is due to the continued rubbing and irritation of a rough or carious tooth, or of a badly-fitting denture. It is always seen on the tip or edge of the tongue, never on the dorsum; it may vary much in character being sometimes a mere crack or excoriation, at others a definite ulcer perhaps an inch in length. In the more acute cases the surface of the ulcer is covered with a shreddy slough, the edges are sharply cut and irregular as if eaten out, and the surrounding area is swollen, sodden, and thickly furred. There is much pain, especially when the tongue is moved, the saliva is increased and the breath offensive. In more chronic cases there is not so much swelling around the ulcer, the edges are not so sharply cut, the surface is free from slough, and the subjective symptoms are much less intense, but the tissue upon which the ulcer rests

is apt to become indurated, often to a considerable extent.

The *diagnosis* of the acute form of dental ulcer is not as a rule difficult. The rapid formation of the ulcer, the sloughy nature of its surface, the sodden condition of the surrounding parts, and the situation of the ulcer opposite a ragged tooth suffice to distinguish it from other ulcers. The diagnosis of the chronic form is much more difficult ; it may be confounded with a primary syphilitic chancre, a gummatous, tubercular, or cancerous ulcer. The recognition of the primary syphilitic sore is fairly easy when it is suspected, but its extreme rarity renders it liable to be overlooked. A gummatous ulcer may usually be distinguished by its larger size, greater induration, deeper and fouler surface, and by the presence of other gummata and associated signs of past or present syphilis on the tongue or elsewhere. A tubercular ulcer may be distinguished by its greater depth, absence of induration and the presence of tubercles in the surrounding parts of the tongue, and of tubercular lesions of the lungs or larynx. The most difficult and important point in diagnosis is to distinguish between a chronic dental ulcer and the early stage of cancer of the tongue, and the difficulty is increased by the fact that a chronic dental ulcer may become cancerous, so that there is a period of transition in which a decided diagnosis is impossible. There are, however, certain points, a consideration of which will materially assist the diagnosis. They are the age and sex of the patient, the presence or absence of induration, and the microscopic characters of a scraping from the surface of the ulcer. Cancer of the tongue is extremely rare under thirty, therefore in a person below that age the question of diagnosis between chronic dental ulcer and cancer, can be easily

settled. Unfortunately it is in older persons that the difficulty in diagnosis arises, and here age does not help. Cancer of the tongue is much more common in men than in women, but this fact is not of much assistance in deciding upon an individual case. The absence of induration may be considered to negative the diagnosis of cancer, but its presence may be due to either condition. If a scraping from a cancerous ulcer be examined under the microscope, a large number of epithelial cells will be seen; they differ from those observed in health or from the surface of a simple ulcer; they vary greatly in size and shape, some are flattened scales, others rounded, oval, elongated with tapering ends, or flask-shaped; there are usually three or more large nuclei containing nucleoli as large as the nuclei of normal epithelium; sometimes typical cell-nests are discovered.

To sum up, it may be considered a safe, practical rule to regard every chronic, indurated ulcer of the tongue in a person over 40 years of age as cancerous or likely to become so unless efficiently treated.

The treatment consists in removing the source of irritation; rough teeth should be smoothed down, carious ones filled or extracted, and artificial dentures "relieved" or laid aside for a time. If the ulcer is unhealthy and sloughy, and the tongue much furred, a brisk purge should be given, and the mouth frequently rinsed with chlorate of potash gargle. In chronic cases, if the ulcer does not quickly heal after removal of the source of irritation or if there be any suspicion that it is becoming malignant, it should be excised, and with it an area of a quarter of an inch of healthy tissue.

Mercurial Ulcers. Ulcers may form on the tongue during the course of mercurial stomatitis. They are usually

shallow and irregular in shape, and surrounded by a red areola. They are the result of sloughing of the mucous membrane, and usually portions of slough are seen covering the ulcers partly or completely.

Syphilitic and *Tubercular* ulcers of the tongue have already been described (see pp. 153 and 157).

Cancerous Ulcers will be described under the next section.

CANCER OF THE TONGUE.

Sarcoma of the tongue is such a rare disease that it is only necessary to mention that a few cases have been recorded. Carcinoma, on the other hand, is of very common occurrence. It is remarkable that only one variety of carcinoma (viz. the squamous-celled epithelioma) affects the tongue. Any part of the tongue may be affected, but it is more common on the anterior half than the posterior and on the edges than on the dorsum.

The essential *cause* of cancer of the tongue is, like that of other tumours, still unknown, but the conditions which favour its growth and development are more evident in the tongue than in any other part of the body.

Age has a most important influence. The disease is almost unknown before the age of thirty; the great majority of cases occur between forty and sixty.

Males are much more liable to the disease than females, the proportion being as great as six or seven to one. This is probably due to the greater prevalence of smoking, spirit-drinking and syphilitic affections of the tongue in the male sex.

The influence of inheritance as a predisposing cause of

cancer has been exaggerated in past years, sufficient allowance not having been made for the effects of similar conditions affecting both parent and offspring.

Smoking and tobacco chewing have no direct effect in producing cancer, but if they cause soreness or excoriation of the tongue they do to a certain extent act as predisposing causes. Cancer much more often affects a tongue which has been the seat of previous disease than a healthy one. Such conditions as leucoma, fissures, ulcers and scars, whether syphilitic or not, are well-known precursors of cancer, especially when they have been repeatedly irritated by caustics or other unsuitable remedies. Carious teeth, badly-fitting dentures, highly seasoned food, strong drinks, the rough stem of a tobacco pipe may all cause sore places on the tongue, and so act as predisposing causes of cancer.

Cancer of the tongue may *commence* in various ways; the first evidence of disease may be a blister, an excoriation, an ulcer, a fissure, a papule, a wart, or a lump. This variability is not due to any inherent mutability such as one sees in syphilitic affections, but to the number of different conditions upon which cancer may become engrafted.

A blister or papule very soon becomes a small excoriation or ulcer, so one description will suffice for the first five conditions mentioned above. It is but rarely that the first commencement as a blister or papule is seen, so soon do they become ulcerated. The ulcer thus formed is usually chronic and indolent, discharging but little, causing little or no pain, and showing no tendency to change; if on the border of the tongue, it stands out on a slightly raised base. As the result of continued irritation the ulcer slowly enlarges, or the fissure becomes deeper; the surrounding area becomes a little angry

and the base of the ulcer imperceptibly harder. The advent of induration is a most important feature and may be taken to indicate that the sore has become cancerous.

Small warty growths with well marked pedicles in young persons are of very little importance, but dense hard warty lumps in older subjects especially when found on a leucomatous tongue, are very liable to become cancerous. This unfavourable change is indicated by the growth becoming larger and firmer, and by the surrounding area becoming indurated; ulceration soon occurs.

The least frequent way in which cancer begins is as a small lump or nodule in the deeper part of the mucous membrane. Such a lump is probably cancerous from the first. It slowly enlarges and projects upon the surface of the tongue and breaks, giving rise to a foul sore with everted edges, or allowing a fungous mass to protrude.

The *objective characters* of the fully developed disease are very striking, although differing considerably in different cases. Sometimes it forms a large prominent mass composed of several red raw tubers growing from a constricted base and surrounding a central depression occupied by a dark greenish-grey slough resembling "the unfolding of some hideous flower, with its red and fleshy petals turned back, and a horrible mass of corruption hiding its pistil and stamens." Sometimes one half of the tongue is transformed into a raised warty and granular mass of irregular form covered here and there with sloughs or coagulated pus, and broken by deep and irregular fissures. Sometimes the disease forms an oval ulcer devoid of granulations, but with a smooth glazed surface and its central part depressed. Occasionally the whole tongue is transformed into a hard inelastic substance like a

piece of wood. Although ulceration occurs early as a rule, and is a characteristic feature, it is sometimes absent in cases of warty epithelioma, the growth resembling a simple papilloma, but for its indurated base. A common form for the disease to assume is that of a deep foul excavation with raised everted nodular edges, and a surface covered with slough, pus and decomposing food. The glands beneath the jaw are early involved and assume the hard fixed character already described when speaking of epithelioma of the jaws.

The chief *subjective symptoms* are pain and salivation. Pain is often present from the first ; it may be lancinating, aching or gnawing, and frequently radiates to surrounding parts, especially the ear. In some cases the pain is so slight that patients do not seek advice until the disease has assumed very serious proportions. Pain is of course increased by taking food and by mastication. Salivation is not usually a source of much trouble until the disease is far advanced, but in the later stages it is very distressing, and greatly aggravates the patient's sufferings.

The *course* the disease pursues depends to a large extent upon its position. If situated on the border of the tongue, it tends to infiltrate the floor of the mouth, and extend to the mandible ; the tongue becomes fixed in the mouth and can no longer be protruded. When the disease commences at the back of the tongue, it spreads to the epiglottis and even the larynx, or involves the arches of the palate and tonsil. The spread of the disease to neighbouring parts renders speech and swallowing difficult and painful. When the tongue is fixed to the floor of the mouth and there is much salivation, it is sometimes impossible to understand what the patient says. Fluids and soft solids can be fairly easily swallowed,

but food which requires masticating and collecting from between the teeth is a source of great trouble.

The majority of patients die of exhaustion brought on by hæmorrhage, pain, salivation, inability to take sufficient food, suppuration, and want of sleep. The fatal result is often determined by the onset of septic pneumonia.

The *duration* of the disease in unoperated cases is about eighteen months from the onset but many cases die within a year.

The *diagnosis* of cancer of the tongue in its advanced stage is usually a matter of no difficulty, but in its early stage it is often well nigh impossible to differentiate it from syphilitic affections, tubercular ulcers, innocent papillomata, and simple ulcers and fissures, and the difficulty is increased by the fact that most of these conditions may be transformed into cancer by almost imperceptible gradations.

The diagnosis of a primary sore upon the tongue has already been dealt with. Secondary syphilitic affections are scarcely ever mistaken for cancer, but in the tertiary stage mistakes are easily made. An unbroken gumma may be mistaken for that sort of cancer which commences as a lump or nodule in the deeper parts of the mucous membrane. The resemblance between the two conditions may sometimes be so close as to render diagnosis impossible; both occur for the most part on the dorsum, in both cases the lump is at first ill-defined, firm and intimately associated with the tissues of the tongue, in both the progress of the disease is at first slow, and there is no affection of the glands. On the other hand gummata may be multiple, whereas carcinoma is nearly always single. A history of syphilis may be obtained, or there may be scars or other signs of previous syphilitic

disease, but too much weight must not be attached to them, as cancer may occur in old syphilitic tongues. In these cases the effect of treatment by large doses of iodide of potassium may clear up the diagnosis. Gummata may also be mistaken for cancer when they have become ulcerated. In making the diagnosis the following points must be borne in mind ; gummata frequent the central portion of the tongue, cancer chiefly the borders ; the edges of the gummatous ulcer are usually undermined, those of cancerous ulcers are raised, nodular and hard ; gummatous ulcers are often multiple and are rarely so deeply or so widely indurated as cancer ; the lymphatic glands are scarcely ever affected in tertiary syphilis, whereas they are almost always involved in cancerous ulcers of any duration. The effect of antisyphilitic treatment may clear up the diagnosis, but on the other hand, it may lead to a waste of valuable time ; it should therefore only be employed in quite early cases. A microscopic examination of a scraping from the surface of the ulcer may afford valuable information. (See page 168.)

The diagnosis between tubercle and cancer is often a matter of great difficulty. The same situation is common to both, both may have their origin in an injury, and in both there may be lymphatic enlargement. In typical cases the absence of decided induration, the sodden condition of the adjacent portions of the tongue, the pale pink colour of the surface of the ulcer, the presence of caseous material, and the small yellow tubercles in the surrounding mucous membrane serve to distinguish a tubercular ulcer. Tuberculous ulcers often appear in subjects who are too young for cancer and in whom there are other signs of tuberculosis. The differential diagnosis between these two conditions is not a matter of very

great importance, as the treatment is the same in both, viz., excision.

In distinguishing between a simple and a cancerous wart, most reliance must be placed upon the presence or absence of fixation, induration and ulceration, and it must be borne in mind that a simple wart may become cancerous. The examination of a scraping from a warty growth is of no value unless the surface is ulcerated.

The diagnosis between a simple ulcer and a cancerous ulcer has already been discussed (p. 167).

The *treatment* of cancer of the tongue comprises the treatment of pre-cancerous conditions as well as that of the fully developed disease ; indeed the former is much more important than the latter, for although cancer can nearly always be prevented by timely and judicious treatment of innocent sores, it is but rarely that the fully developed disease can be permanently cured. All indolent ulcers and warty growths in persons over thirty, must be dealt with by remedies most likely to effect a cure, and they must be most carefully guarded from every source of irritation. Rough or carious teeth and badly fitting dentures must be efficiently treated by the dentist. Smoking, tobacco chewing, strong wine and spirits must be given up, the food must be neither very hot nor very cold, neither very sour nor very sweet, and not highly spiced. All applications to the sore place must be unirritating, and caustics must be religiously avoided. If under careful treatment an indolent sore or wart does not show marked signs of improvement in a fortnight or three weeks, it should be cut out. The operation is a trivial one, as it is only necessary to remove the disease and a small surrounding area of healthy tissue. In many cases it may

prove the means of saving the patient from the horrors of death from lingual cancer.

The operative treatment of actual cancer of the tongue is not attended with good results, and this is chiefly due to the operation being so often postponed until the disease has become so extensive that it cannot be thoroughly removed. It is estimated that only about 10 per cent of patients operated on for cancer are permanently cured, and that in cases in which a cure is not effected, the duration of life is increased six or eight months. It should, however, be added that even though death is the ultimate result, the sufferings of the patient are much less when it is brought about by a recurrence of the disease in the glands of the neck, than when it is due to a continuance of the growth in the mouth. The mortality directly due to the operation is rather over 10 per cent.

As a general rule unless the disease can be very fully and freely extirpated, it is better not to operate, for the tendency to recurrence *in situ* is very great. When the disease has extended to the floor of the mouth, the mandible, the arches of the palate, the tonsil, or has largely infiltrated the glands of the neck, the advisability of operating is doubtful. In determining the question much will depend upon the general condition of the patient.

The tongue may be removed either wholly or in part by the following methods :

(1) From within the mouth, without external incision.

(a) by ecraseur. (Morrant Baker).

(b) by scissors (Whitehead).

Galvano-Cautery

(2) From ^{(c) knife} within the mouth, the cheek being divided on the same side as the disease (Furneau Jordan).

-
- (3) Through the mylo-hyoid space (Regnoli).
 - (4) By division of lower lip and jaw. (Syme).
 - (5) Through submaxillary region. (Kocher).

For the details of these operations, and the various conditions for which they are suited, a work on Operative Surgery should be consulted.

CHAPTER XX.

DISEASES OF THE GUMS.

The mucous membrane of the gums is liable to the same inflammatory affections as that lining the rest of the buccal cavity. These have already been dealt with (see Stomatitis). Tumours of the gum have been described in the section devoted to Tumours of the Jaws. There are, however, some other diseases which require mention here.

HYPERTROPHY OF THE GUMS.

Hypertrophy of the gum may result from the irritation caused by badly fitting dentures or accumulations of tartar. In such cases the hypertrophy is not great, and it is very seldom that it is necessary to do anything more than remove the cause of irritation. But in children a peculiar variety of hypertrophy of the gums is sometimes met with. It commences at the time that the temporary teeth are being cut, viz., between the ages of six months and two years. The gum increases in size so that eventually the teeth become almost completely hidden from view by large papillomatous

or polypoid-looking projections of the same colour as the normal gum; although in places they are soft, vascular, and spongy-looking, they are mostly firm and fibrous to the touch. The disease usually affects the whole of the alveolar arch in both jaws, but may sometimes be limited to the incisor region. In some cases the overgrowth is sufficiently large to project from the mouth and to bulge out the cheeks. Mastication is considerably hampered.

Microscopic examination proves the growth to be a pure hypertrophy of the gum, chiefly the fibrous portion. In structure it consists of a dense stroma of interlacing fibres, containing much glandular tissue in its interstices and covered on its surface by large and vascular papillæ. The growth appears to start from the periosteum around the necks of the teeth.

The subjects of this disease are often deficient mentally. Sometimes it occurs in several members of the same family.

Treatment. It will not suffice simply to pare away the hypertrophied tissue, as recurrence is pretty sure to follow. This is owing to the disease affecting the sockets of the teeth as well as the gum. To effect a permanent cure it is necessary to remove the alveolar margin as well. The germs of the permanent teeth in the vicinity of the disease must be avoided as far as possible.

Polypus of the gum is the name given to a localized hypertrophy of a portion of gum usually between two teeth. It is produced by the irritation of a rough or carious tooth tartar, or some portion of an artificial denture. In microscopic structure it resembles gum tissue. Sometimes the growth encroaches upon the cavity of a carious tooth so as to simulate polypus of the pulp, but it may be distinguished from

the latter by its greater sensitiveness and by its pedicle or base of attachment being between the teeth and not within the carious tooth.

The *treatment* consists in removing the source of irritation and snipping off the growth with scissors. Its base should be touched with nitrate of silver or with the electric cautery. Recurrence does not take place after effectual removal.

CHAPTER XXI.

DISEASES OF THE FLOOR OF THE MOUTH.

RANULA.

A ranula is a cyst under the tongue usually on one side of the frænum. Different views have been held as to the nature of the cyst and its mode of formation. It was formerly thought that it was always the result of dilatation of Wharton's duct. Although some ranulæ may be due to this cause, the majority of them are of a different origin; the shape of the swelling is not that of a dilated duct of Wharton, nor is the submaxillary gland itself swollen as it is in cases of obstruction of the duct by a salivary calculus; moreover it is sometimes possible to pass a fine probe along the duct for an inch or more by the side of the cyst.

Ranula has also been attributed to dilatation of one of the ducts of the sublingual gland, but the shape of the swelling and the condition of the gland itself negative this view.

It is now held that the disease is usually due to dilatation of the duct of the Blandin-Nuhn gland, a small mucous gland situated on the under surface of the tongue a little to one side of the middle line. Von Recklinghausen

had the opportunity of dissecting a subject in whom there was a ranula, and discovered the remains of the Blandin-Nuhn gland projecting into the cavity of the cyst; he also found that the epithelium lining the ranula was similar to that of the gland.

The disease is nearly always very chronic; it causes no pain and may pass for a long time unnoticed. The only subjective symptoms which it produces are a slight discomfort in mastication and a sense of fulness under the tongue.

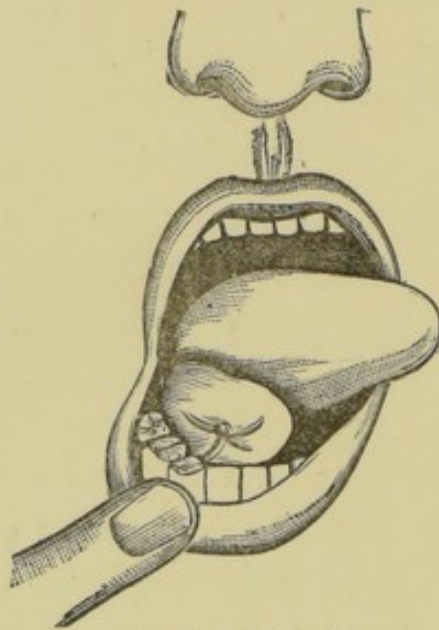


Fig. 55. Ranula.

When the mouth is opened and the tongue turned back, a ranula is plainly visible as a smooth bulging swelling of a deep bluish colour, tinged with pink, and more or less translucent; large tortuous vessels are often seen coursing upon its surface. It is usually very soft to the touch, but may feel tense; fluctuation can be easily detected.

The *treatment* usually adopted is to cut out a portion of the cyst wall with scissors; the fluid thus evacuated is clear

and viscid. A simple incision without removal of a portion of the cyst wall is usually followed by a re-accumulation of the fluid.

Some surgeons prefer to introduce a seton and leave it in position for a week. If the above methods fail, a triangular flap of the cyst wall should be cut and stitched back into the cavity of the cyst; this effectually prevents the cyst from closing before its cavity is filled up. Lastly, the cyst may be completely removed, but the proceeding is a difficult one.

DERMOID CYSTS.

Dermoid cysts in the floor of the mouth are due to the folding in of a portion of the integument during the coalition of the two lateral halves in the process of development, or to imperfect obliteration of the lingual duct. In this manner a cavity lined by skin is formed. The epithelial lining of the cyst wall is usually tough and fibrous; it produces a thick material resembling sebaceous matter and composed of cast-off epithelial cells, oil, cholesterine, fatty debris and sometimes hairs. The cyst is situated either in the middle line between the two genio-hyo-glossi muscles, or a little to one side between the genio-hyo-glossus and the mylo-hyoid. It is usually single but sometimes one is found on each side of the middle line.

Although of congenital origin it is very seldom that dermoid cysts in the floor of the mouth are noticed before the age of fifteen or twenty. The subjective symptoms which they produce are of but slight importance, although more pronounced than those produced by ranula, owing to the more solid nature of the cyst contents; discomfort in eating and speaking, and

a sense of fulness are usually the only symptoms complained of.

The tumour projects both into the floor of the mouth and in the neck between the chin and the hyoid bone, forming a lump as large as a hen's egg or larger. The surface of the tumour is smooth, and its outline rounded or elongated; the mucous membrane covering it is of a yellowish tint, and not translucent as in ranula; pressure produces distinct pitting in some cases. Fluctuation can usually be obtained both inside the mouth and in the neck; but the feeling is much more doughy than in a case of ranula.

The diagnosis is usually easily made. In case of doubt it may be cleared up by an exploratory puncture.

Treatment. The cyst may be incised through the mouth, and the cavity packed with gauze after evacuation of the contents. It is, however, more satisfactory to remove the sac completely; if the tumour be small this can be easily done from within the mouth. If the tumour be a large one, it must be removed through an incision below the jaw, either in the middle line of the neck or over the most prominent part of the tumour; the dissection is not usually difficult or dangerous.

SALIVARY CALCULUS.

A salivary calculus not very uncommonly forms in the duct of the submaxillary gland. In size and shape it somewhat resembles a fragment of slate pencil. It consists of phosphate and carbonate of lime and phosphate of magnesia. It forms very slowly and may remain for years without causing any symptoms; but eventually inflammation is set up, the surrounding tissues become swollen and painful, and the duct more or

less completely obstructed. As the result of this obstruction and of inflammation spreading backwards along the duct, the sub-maxillary gland becomes enlarged.

When the interior of the mouth is examined the tongue is found somewhat swollen; the parts between the tongue and the floor of the mouth on the affected side are red, swollen and tender. On palpating beneath the jaw the submaxillary gland is found to be enlarged and hard, but not as a rule tender to the touch. The presence of the symptoms just enumerated should always lead to an examination of the submaxillary duct. On introducing a fine probe a rough and gritty mass will be felt, usually near the orifice, but sometimes further back.

Treatment. The calculus must be removed through an incision made directly over it. Great care should be taken not to break it, as any fragments left behind are difficult to remove and are apt to cause even greater irritation than the original concretion.

CHAPTER XXII.

DISEASES OF THE LIPS.

HYPERTROPHY.

Hypertrophy affects the upper lip more often than the lower. It is usually due to the irritation of cracks or fissures about the mouth, and chronic nasal catarrh in strumous children. In such cases it is often known as *strumous lip*; but it may occur in congenital syphilis. The hypertrophy usually disappears as the general health improves under appropriate constitutional treatment. Sometimes it is necessary to remove a portion of the hypertrophied tissues.

INFLAMMATORY AFFECTIONS.

The different inflammatory affections described under "stomatitis" affect the mucous aspects of the lips in common with the rest of the buccal mucous membrane, and not unfrequently overflow to their cutaneous surfaces. Thus superficial ulcers similar to those occurring on the tongue and cheeks are often met with in secondary syphilis, or as the result of dyspepsia. Cracks and fissures at the red margin of

the lips may be due to the same causes, or may result from exposure to cold winds, etc. If neglected they may become deep and painful, and prone to bleed when the lip is stretched in laughing, yawning, etc. They are often difficult to cure; in the first instance they should be treated with a simple ointment; if they prove obstinate they should be touched with nitrate of silver. The patient should be advised to avoid opening out the fissure by stretching his lips.

Primary syphilitic sores are not uncommon on the lips. They are caused by inoculation of some crack or excoriation on the lip with the discharge from mucous tubercles in the mouth of an infected person, or by using a drinking vessel immediately after a person with secondary syphilitic disease of the mouth. Either lip may be affected, but the upper is more commonly the site of a chancre than the lower. It is most often seen in young persons, especially females. The sore is usually raised, roughly circular, excoriated upon its surface, and discharging sanious pus, or sometimes having a tendency to scab over. The base of the sore is usually more or less indurated, but the induration is not so marked as in chancres on the genital organs. The lymphatic glands under the jaw very soon become enlarged and indurated, and symptoms of secondary syphilis appear in due course. Primary sores on the lips sometimes simulate epithelioma. A comparison of the description just given, with that of epithelioma given below, will suffice to show how the differential diagnosis may be made. The treatment is the same as that of syphilis acquired in the usual way.

Carbuncle of the lip is a much more severe affection than carbuncle of other parts. There is considerable doubt whether the disease is really the same. It usually affects the

upper lip and begins as a vesicle or pustule surrounded by a red blush and swollen oedematous skin. The swelling rapidly extends, often involving the greater part of one side of the face. Suppuration takes place after a few days, and the skin in the central part becomes dusky, and the subcutaneous tissue breaks down into soft sloughs soaked in pus. The local sore is accompanied by very severe fever and signs of septic intoxication. Death may be due to septic absorption, or to infective phlebitis of the facial vein spreading to the intracranial veins and producing meningitis or general pyœmia. The disease sometimes closely resembles malignant pustule, but the black slough surrounded by vesicles and the typical bacilli characteristic of the latter disease are not found in facial carbuncle. The treatment consists in making free incisions, scraping away all the sloughs and applying strong antiseptics. The patient's strength must be supported by generous use of stimulants and fluid nourishment.

Herpes of the lips has already been described (See Exudative Stomatitis).

Lupus vulgaris is very common upon the face, especially the nose and the neighbouring part of the cheek. It often affects the lips, especially the upper. It is a form of tuberculosis, its distinctive feature being the formation of nodules of granulation tissue in the corium. These nodules are soft, brownish-red and translucent, resembling apple-jelly. They are at first buried in the skin, appearing as small red papules on the surface. The papules gradually become larger, and the skin between them thickened and reddened by inflammatory infiltration. The patch thus formed may slowly undergo involution, leaving a smooth firm scar not unlike that of a burn. In the majority of cases, however, ulceration takes

place sooner or later, producing a granular sore covered with greenish-black crusts, and surrounded by apple jelly nodules in various stages of development and disintegration. The disease may extend from the lips to the inside of the mouth involving the gums, palate and tongue. The lips may become adherent to the gums, and to some extent to each other, at the angles of the mouth, thus considerably diminishing its size.

The treatment consists in a complete removal or destruction of the diseased tissue by the application of caustics and the use of Volkmann's spoon.

TUMOURS.

Cysts frequently occur on the lips; they are due to distension of mucous follicles. They form small, tense, globular, semi-translucent, bluish pink swellings, containing a glairy fluid. They should be dissected out, as they are apt to refill if they are simply incised.

Nævi are not uncommon. They may be recognized by their characteristic appearance and congenital origin. When small they may be touched with nitric acid or ethylate of sodium; when large and projecting on the mucous aspect of the lip they may be ligatured; when involving the whole thickness of the lip they may be dealt with by electrolysis or excision.

Adenomata occur in the lip as small globular elastic swellings projecting under the mucous membrane or sometimes under the skin. They are composed of glandular tissue resembling that of the glands found in the mucous membrane of the lips; sometimes however they contain nodules of cartilage. They may be easily shelled out through an incision through the mucous membrane.

Papillomata are common on the lip ; they sometimes form horn-like projections. They should be extirpated with the knife as they have a tendency to become epitheliomatous.

Epithelioma nearly always affects the lower lip and occurs in men, being most frequently caused by the irritation of a

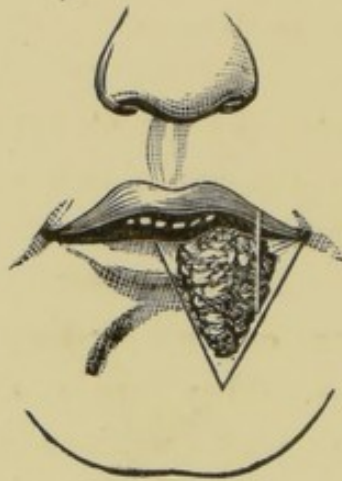


Fig. 56.—Epithelioma of lower lip. The lines of incision for removal are shown.

short clay pipe. It begins as a small crack, ulcer or indurated tubercle which may spread superficially along the margin of the lip or deeply into its substance. Eventually it forms a large mass involving the whole lip and adjoining parts including even the lower jaw ; its surface is ulcerated and has hard sinuous and everted edges and a widely indurated base. The glands under the jaw become infiltrated, but not as a rule until the disease has lasted some six or nine months. Dissemination through the internal organs is rare. The treatment consists in early and free excision. This is usually best accomplished by a V-shaped incision, the margins of which are subsequently brought together with hare-lip pins and twisted sutures. The diseased glands in the neck should be

removed at the same time. Sometimes it is necessary to remove a portion of the lower jaw as well. The results of the operation are extremely good as compared with those for extirpation of malignant disease inside the mouth. If removed early the disease may be completely and permanently cured. When recurrence does take place it is more often in the glands of the neck than in the scar.

Rodent Ulcer occurs in old people, mostly over fifty, and is twice as common in men as in women. It begins as a small papule or tubercle usually near the inner canthus of the eye, but occasionally on the lips or chin. After some time, perhaps years, the tubercle becomes a small ulcer with irregular sinuous edges, a depressed, pale pink, glazed surface devoid of granulation but often covered with a scab, and a slightly indurated base. The ulcer slowly spreads, although in places and at times, it makes feeble attempts to cicatrize; thus after many years the greater part of the face may be converted into a large and ghastly chasm. The disease is closely allied to epithelioma, but differs from it in that the epithelial growth starts from the hair follicles and sebaceous glands instead of from the surface epithelium, and that the epithelial cells are smaller and rounder and not so often or so distinctly grouped into cell nests. It is also much less malignant, its course being slower, and it having no tendency to infiltrate lymphatic glands or to disseminate in the internal organs. It does not recur after complete removal. The treatment consists in freely removing the disease with the knife, and the application of caustics to what cannot be thus removed.

DISEASES OF THE CHEEKS.

The chief surgical affections met with in the cheeks are abscesses, (either strumous or secondary to dental trouble), primary syphilitic sores, tertiary syphilitic ulcers, the different inflammatory affections described under "stomatitis," mucous and sebaceous cysts, lupus, epithelioma and rodent ulcer. Most of these affections are so much like those affecting the lips that a separate description is unnecessary, but the condition described in the following paragraph deserves notice.

SALIVARY FISTULA.

This results from of wound of Stenson's duct. It consists of a small opening on the cheek from which saliva dribbles during mastication. The treatment consists in restoring the continuity of the duct and providing a free opening for it into the mouth, and then if the fistula does not heal, closing it by a plastic operation.

CHAPTER XXIII.

DEFORMITIES OF THE MOUTH.

As the mode of origin of hare-lip, cleft palate and macrostoma is unintelligible without some knowledge of the method of development of the parts concerned, it will be well to recall to mind the chief features in the process.

The prominent part of the nose and the front part of the nasal septum are developed from the fronto-nasal process (Fig. 57, 1) descending from the base of the skull between the rudimentary eyes. This bifurcates below into two mesial nasal processes (2). They coalesce in the middle line to form the intermaxillary bone with the incisor teeth, the central part of the upper lip and the columna nasi. Outside them on each side is a depression which forms the nasal orifices (3) and outside these again are the lateral nasal processes (4) which form the alæ nasi. The remainder of the face above the mouth is formed by the superior maxillary plates (5) which grow forwards and inwards to coalesce with the nasal processes. The lower jaw and the soft parts covering it are formed in like manner by two inferior maxillary

plates (6) advancing from each side and coalescing in the middle line. The superior and inferior maxillary processes of each side coalesce to a great extent but not completely, the gap left forming the mouth.

The mode of origin of the various deformities under consideration will now be readily understood. If one superior maxillary process fails to unite with the fronto-nasal process, a fissure will be left through the upper lip to one side of the

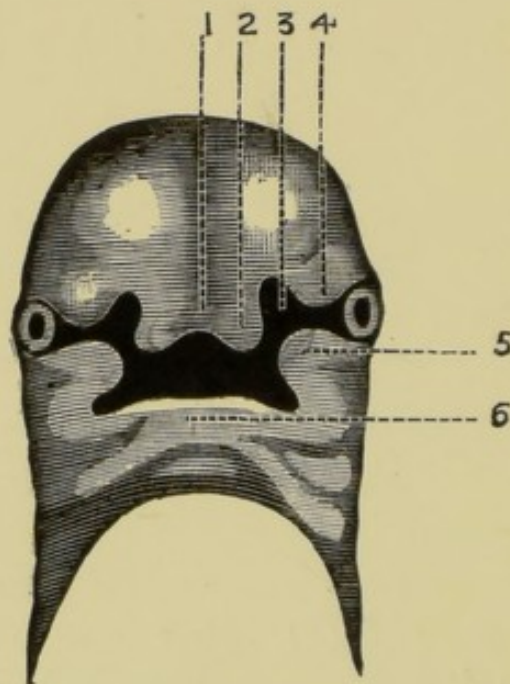


Fig. 57. —Development of Mouth and adjacent parts (His.)

1. Fronto-nasal process ; 2. Mesial nasal process ; 3. Nasal Orifice ;
4. Lateral nasal process : 5. Superior maxillary process ;
6. Inferior maxillary process.

middle line forming a single hare-lip (Fig. 58 and 59). If both superior maxillary plates fail to unite with the fronto-nasal process a double hare-lip (Figs. 60 and 61) results, the intermaxillary bone being often left adherent to the tip of

the nose and the nasal septum. A large median hare-lip is the result of arrest of development of the fronto-nasal process (Fig. 61). A small and incomplete median cleft may result from the failure of the two median nasal process to unite. When the palatal processes of the superior maxillary plates fail to unite, the result is a cleft palate. This condition may exist alone or in combination with any variety of hare-lip.

Macrostoma, or congenital tranverse fissure of the face, is due to arrested coalescence of the superior and inferior maxillary plates.

HARE-LIP.

The different varieties of hare-lip have already been sufficiently indicated in the preceding paragraph.

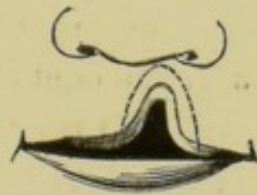


Fig. 58.—Partial Single Hare-lip, showing line for operation.

The fissure may be little more than a mere notch in the edge of the lip (Fig. 58). More often, however, it extends



Fig. 59.—Single Hare-lip, extending into nostril.

more deeply into the substance of the lip, or even completely into the nostril (Fig. 59). The deformity is much more often

single than double, and occurs on the left side more often than the right. The two margins of the cleft are usually unequal in length, and the mesial is often rounded, the outer somewhat flattened.

In double hare-lip the central portion is often shorter than the lateral portions of the lip, and projects further forwards ; the incisors are then much in advance of the other teeth, owing to elongation of the intermaxillary process.

Treatment. The deformity must be remedied by a plastic operation. The best age for operation is between three and five months. Very young children stand hæmorrhage badly. Dentition begins soon after five months, and may seriously interfere with the success of the operation. It is important that the child should be in as good a state of health as possible. The surgeon aims at obtaining primary union, thereby closing up the gap with the smallest amount of scarring. The neces-



Fig. 60.—Partial double Hare-lip.

sary incisions should be made with a very sharp knife to avoid bruising the tissues ; the edges of the cleft should be sufficiently freely pared to leave broad raw surfaces, which should be concave towards the middle line of the cleft, so as to lengthen the line of union ; the lip should be freed from the gum at the apex of the cleft, so as to avoid tension ; and great care should be taken to ensure accurate adaptation of the raw surfaces, especially at the free margin of the lip.

The details of the operation vary considerably, according as the cleft is single or double, or complicated by protrusion of the intermaxillary process.

Operation for Single Hare-lip.—The lip having been compressed on either side of the cleft by a suitable clamp (such as Smith's) to control hæmorrhage, the surgeon first

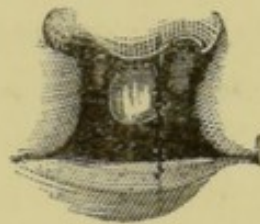


Fig. 61.—Double Hare-lip. Inter-maxillary bone imperfectly developed.

frees the lip from the gum at the angle of the cleft ; he then pares the edges with a sharp fine scalpel, taking care to remove the whole of the rounded portion of the prolabium on

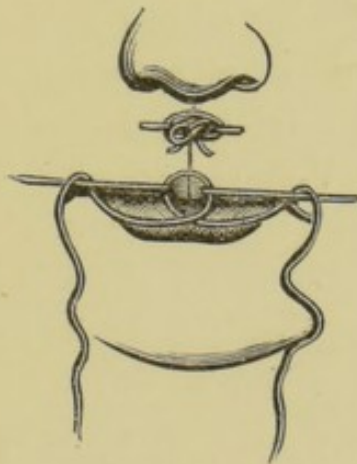


Fig. 62.—Operation for Hare-lip.

each side of the base of the cleft. The raw surfaces are then brought into accurate apposition by means of two hare-lip pins. The lower pin should be passed first, and should be

made to transfix the coronary artery, care being taken that the pin does not penetrate the mucous membrane, and double in a fold of it between the pared edges ; being satisfied that the first pin brings the margin of the prolabium accurately into line, the upper one is passed in the same way and a silk suture twisted round each. The ends of the pins are then cut off with pliers, and a small pad of gauze placed under each to prevent injury to the cheek ; several horse-hair sutures are then inserted to complete the apposition. The parts are then dried and covered with collodion, and a piece of strapping applied from cheek to cheek to support the lip and prevent traction when the child cries. In cases in which the cleft is not very wide or deep, silk-worm gut sutures may be used instead of hare-lip pins ; when the latter are used they should be removed after twenty-four to thirty-six hours ; if left longer they will produce scars. The twisted silk suture is not disturbed by removing the pins, and should be left adhering to the lip until firm union has taken place.

When the fissure does not extend through the whole lip Nelaton's operation may be performed. This consists in making an inverted V-shaped incision with its angle just above the apex of the cleft, each arm stopping short of the prolabium. The tissues below the incision are then drawn down, leaving a diamond-shaped wound ; on bringing the raw surfaces together by passing a suture or hare-lip pin horizontally, a projection on the border of the lip will be produced in place of the original cleft ; this disappears in time leaving the margin straight.

Operation for double Hare-lip.—This is conducted on the same principle as that for single hare-lip. When the premaxillary process projects, it should not be removed unless it is

very small and too much out of place to be made use of; it is better, if possible, to force it back into place by partially dividing its base of attachment, or by removing a wedge-shaped piece from the septum of the nose. The central piece of lip should be completely pared; two flaps are then cut from the lateral portions, and brought down and united to each other below the central part; the latter is sutured to the two united lateral pieces.

CLEFT PALATE.

Cleft Palate results from failure of the palatal processes of the superior maxillary plates to unite with each other in the middle line and with the premaxillary bone in front. The cleft may be complete, extending through the middle of the uvula, soft palate and hard palate, and through the alveolar process at the line of suture on one or both sides of the premaxillary bone, or it may involve the uvula alone, or the whole length of the soft palate, or a portion of the hard palate as well. The lower border of the vomer may be free in the cleft or attached to either margin.

The malformation interferes very much with the functions of the mouth. On swallowing fluids regurgitation takes place through the nose. Infants with cleft palate are unable to suck, and consequently die unless carefully fed by hand. Later in life speech is nasal and indistinct, and taste and smell may also be impaired.

Treatment. The infant must be fed by means of a feeding bottle with a teat large enough to act as a plug to the cleft, or by a spoon passed well to the back of the mouth. The mother's milk should be used, if possible. The operation

should be performed before the child begins to speak, but not in early infancy, as the cleft often diminishes in width during the first two or three years of life ; moreover, infants bear

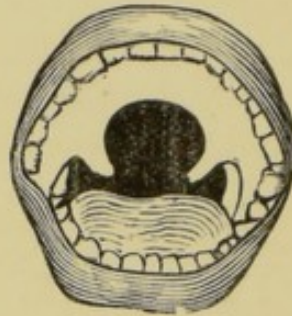


Fig. 63.—Cleft of soft and part of hard palate.

hæmorrhage badly, and are very apt to catch cold and to disturb the parts by coughing and sneezing. Three years is the most suitable age for the operation. The cleft in the hard and soft palate should be dealt with at the same time.



Fig. 64.—The edges pared and the lateral incisions made.

Staphylorrhaphy or closure of the soft palate. Chloroform having been administered, the mouth is widely opened and the tongue depressed by a Smith's gag. The edges of the cleft are then pared from below upwards. The two halves of the uvula and the lower part of the soft palate are united by horsehair sutures and the upper part by silver wire. The

latter is passed by means of Smith's needle, which has a small reel attached behind the handle to hold the wire, and a serrated wheel half way up the handle to protrude the wire from its tubular point. The parts having been brought into accurate apposition, the tension is relieved by making incisions through each side of the soft palate parallel to the cleft and just internal to the hamular process. These incisions secure rest for the opposed surfaces by dividing the palatal muscles.



Fig. 65.—The edges united by sutures.

Uranoplasty, or closure of the hard palate. The edges of the cleft having been pared an incision about half an inch long should be made through the muco-periosteum of the palate on each side of and parallel to the cleft, taking care to avoid the palatine artery. A raspatory is inserted into one of these incisions and the muco-periosteum separated from the bone along the whole length of the cleft. The muco-periosteum is then detached from the posterior margin of the hard palate with curved scissors, one blade being passed through the cleft and the other behind the soft palate whilst the latter is drawn forward. The same process is repeated on the opposite side. Silver wire sutures are then introduced and the raw edges of the cleft brought into apposition. Tension is relieved by prolonging the cuts forwards or backwards as may

be necessary. Hæmorrhage is arrested during the operation by sponge pressure, care being taken to let the blood flow out of the mouth from time to time by turning the head over to one side, and to see that none of it enters and occludes the larynx.

In the after treatment every care must be taken to keep the palate at rest. The patient should be fed for the first few days on iced milk, and on soft food for another fortnight. He should swallow with as little effort as possible, and speaking should be strictly forbidden until union is complete. The stitches may be left in for three weeks or a month, but should be removed sooner if they produce irritation. The surgeon hopes that the whole cleft will unite by first intention ; but not unfrequently a portion of it may fail to unite at once, but may to a large extent close by granulation. When a small circular aperture remains it may often be got to heal by stimulating its margin with nitrate of silver or the actual cautery. If a large gap remains a second operation must be performed.

Speech is sometimes perfectly restored, but this happy result is unfortunately the exception. The voice usually remains more or less nasal or "Punch-like." This is due to two causes ; firstly to faulty habit of articulation, and secondly to the fact that the repaired soft palate is too short in its antero-posterior measurement to completely shut off the nasopharynx. The first cause may be to a large extent corrected by careful instruction in elocution, but the second is of necessity irremediable.

MACROSTOMA.

Macrostoma, or congenital transverse fissure of the face, results from arrested coalescence of the superior and inferior maxillary processes. The cleft extends from the angle of the mouth to the anterior border of the masseter, or even up to the external auditory meatus. In such cases the external ear on the affected side is malformed, the tragus being detached from the auricle, forming a small lobulated excrescence on the cheek ; the helix is often twisted and curled inwards.

This deformity is treated on the same general principles as hare-lip, the edges being pared and united by hare-lip pins and twisted sutures.

ATRESIA ORIS.

This condition may result from excessive coalescence of the superior and inferior maxillary processes, or may be the result of sloughing of the lips. The treatment consists in the performance of a plastic operation.

CHAPTER XXIV.

FOREIGN BODIES IN THE UPPER AIR AND
FOOD PASSAGES.

A great variety of substances may enter the nose, pharynx, larynx, trachea, or œsophagus, and becoming impacted there, produce urgent symptoms requiring prompt and decided treatment.

FOREIGN BODIES IN THE NOSE.

Foreign bodies in the nose are more common in children than in adults. They are usually introduced in play. Sometimes the accident is noticed at once, and the child is brought to the surgeon with a distinct history of a foreign body having been introduced ; the diagnosis is then easy, and removal can be effected with forceps or a bent probe. In the majority of cases there is no history of any foreign body having been introduced, and the child is brought on account of a purulent discharge from one nostril. The pus may be sanious or brown, and in some cases very offensive. The occurrence of unilateral purulent discharge in a child should always lead to

careful examination with speculum and probe, an anæsthetic being given if necessary. In a recent case the foreign body will be easily seen, but if it has been long resident in the nose it may be hidden by swollen mucous membrane, granulations, blood or pus. If seen, it usually looks black, either because that is its natural colour, or because it is covered with dried blood. When it cannot be seen the diagnosis must be made by the probe. It must be borne in mind that unilateral nasal discharge may sometimes result from syphilitic or tubercular disease, although these two conditions are much more common in adults and usually affect both sides of the nose.

Treatment. When the foreign body has been recently introduced, it can usually be removed with a probe bent into a hook, or with a narrow bladed pair of nasal forceps. When the foreign body has been impacted for some time an anæsthetic should be administered; a finger should then be inserted into the naso-pharynx lest the foreign body be pushed backwards and fall into the larynx. Sometimes the desired result may be obtained without any anæsthetic, by forcing air or a stream of water into the opposite nostril whilst the mouth and the affected nostril are kept open.

FOREIGN BODIES IN THE PHARYNX.

For practical purposes foreign bodies in this situation may be divided into two kinds.

(a) Small and sharp, such as pins and fish bones. These cause a sharp pain at the time of impaction, and subsequent irritation which may last for a long time even after the intruder has been removed.

(b) Large bodies such as masses of food or tooth plates. The chief symptom is dyspnœa. Occasionally a large foreign

body may lodge in the pharynx and remain there without causing any serious trouble.

In all cases the nature and situation of the foreign body should be ascertained by careful inspection aided by a good light, and a laryngeal mirror. Sometimes the foreign body is hidden in a fold behind the tonsil and cannot be seen ; in such cases the finger should be introduced and guided to the spot at which the patient feels pain. The finger should not be used until after failure of inspection, on account of the risk of driving a penetrating body further in, or even perforating a large vessel such as the carotid.

When the position of the foreign body has been discovered, it can usually be removed by forceps of suitable length and shape. Large bodies with sharp corners (such as tooth plates) when impacted low down may necessitate pharyngotomy.

FOREIGN BODIES IN THE LARYNX.

Foreign bodies in the larynx may be divided into two classes according to the symptoms they produce. (*a*) those that are large and cause urgent dyspnœa, or being small are so placed as to impede respiration. (*b*) Those that are small and which after the first paroxysm do not cause dyspnœa.

The symptoms may be divided into three stages. 1. Those of obstruction immediately following the introduction of the substance. 2. Those of irritation produced by its presence, and 3. Those of inflammation coming on at a later period.

1. *Symptoms of Obstruction.* When a large body such as a piece of meat becomes impacted at the entrance of the larynx, it may cause instant suffocation. Smaller bodies may also cause intense, even fatal dyspnœa by setting up reflex spasm of the glottis.

2. *Symptoms of Irritation.* The patient is usually first seen by the surgeon after the first attack of dyspnœa has passed off. The voice is then hoarse and croupy, there is a loud, rough sound in respiration, which is more or less impeded, and attended by attacks of spasmodic cough. In adults a laryngoscopic examination may be made in the intervals between the attacks and the position of the foreign body ascertained. In children a laryngoscopic examination is almost impossible, but the foreign body may sometimes be detected by means of the finger passed down to the larynx.

3. *Symptoms of Inflammation.* If the foreign body remain impacted in the larynx, in a day or two it will set up laryngitis from which the patient may die.

Treatment. The treatment must necessarily vary with the urgency of the symptoms, and the nature of the foreign body. Where there is impending suffocation, and the substance cannot be dislodged with the finger, laryngotomy should be instantly performed, as this operation affords the easiest, safest and most rapid way of admitting air. When the symptoms are less urgent, a deliberate attempt should be made to remove the foreign body by forceps under the guidance of the laryngoscope. These means having failed, an external operation must be performed, the position of the opening being adapted to the position of the foreign body; thus when above the vocal cords, sub-hyoid pharyngotomy should be performed; when between the cords, or in the ventricle, thyro-chondrotomy; when below the cords laryngo-tracheotomy or tracheotomy.

FOREIGN BODIES IN THE TRACHEA AND BRONCHI.

Small objects such as buttons, coins, etc., may be drawn into the trachea, if a sudden inspiration is taken during the

act of swallowing, or when such things are being held in the mouth. If the substance is light, it will probably remain free in the trachea, floating up and down with the current of air, but if heavy it will become impacted in the trachea or one of the bronchi. Elongated bodies such as a piece of pencil, more often find their way into the left bronchus, as its axis is more in line with the trachea, whereas rounded bodies more often enter the right bronchus as its lumen at the tracheal bifurcation is larger.

The symptoms are divisible into the same stages as those of laryngeal foreign bodies. At first there is an attack of urgent dyspnoea upon the subsidence of which the most characteristic symptom is paroxysmal suffocative cough and dyspnoea in consequence of the foreign body being driven up against the glottis. These attacks of cough occur only when the body is free to move in the trachea. When it has become impacted in one of the bronchi, it prevents the air entering the corresponding lung, diminishing or abolishing the respiratory murmur. If the foreign body acts as a valve, and allows air to emerge from the lung whilst preventing any entering it, the result is collapse of the lung. If the foreign body remain long in the bronchus it is apt to set up bronchitis, pneumonia, or abscess in the lung; sometimes it may become encysted and do no further harm.

Treatment. Inversion and shaking may be tried in the first instance, but everything should be ready for immediate tracheotomy should the foreign body become impacted in the glottis. Probably the best treatment is to perform tracheotomy in every case, as soon as the patient comes under observation. It often happens that when the trachea is opened, the foreign body is expelled through the wound, or

even through the mouth. Should immediate expulsion not occur, no tracheotomy tube should be inserted, but the edges of the tracheal wound should be kept apart with blunt hooks. Search may then be made by means of tracheal forceps or bent wire.

FOREIGN BODIES IN THE ŒSOPHAGUS.

Tooth plates, coins, etc., most often lodge in the commencement of the œsophagus opposite the cricoid cartilage.

The symptoms are pain, often referred to the episternal notch, a pricking sensation in the throat, difficulty in swallowing and sometimes dyspnœa if the foreign body exerts pressure on the air passage.

Extraction may be effected by means of pharyngeal forceps, the coin catcher, or the expanding horse-hair extractor. Should these means fail the case may be left for twenty-four hours if the substance is of a nature to become softer, and then a gentle attempt may be made to push it onwards towards the stomach with a sponge probang. If the foreign body resists all attempts to dislodge it, it may be necessary to open the œsophagus in the neck, or even in the thorax by resecting a portion of the third, fourth and fifth ribs midway between the spine and the left scapula.

Should an angular body such as a tooth-plate have passed into the stomach the patient should be directed to eat porridge, hair, cotton wool, etc., so that the sharp projections may be sufficiently covered to pass along the intestine without doing harm. If the foreign body is too large to pass the pyloric valve, gastrotomy must be performed.

CHAPTER XXV.

OPERATIONS ON THE UPPER AIR AND FOOD
PASSAGES.

Before describing these operations it will be well to recall to mind the anatomy of the middle line of the neck.

Running from the chin to the hyoid bone there is a raphé between the genio-hyoid muscles ; next in order (proceeding from above downwards) is the thyro-hyoid membrane, which is incised in *sub-hyoid pharyngotomy* ; then comes the notch in the thyroid cartilage (*Pomum Adami*) which can easily be felt in adult males, but is almost indistinguishable in fat children ; in *thyro-chondrotomy* the incision passes through the middle line of this cartilage ; immediately below it is the crico-thyroid membrane through which the opening is made in *laryngotomy*. The cricoid cartilage comes next, opposite the fifth cervical vertebra ; it is a valuable land-mark as it can always be felt. Next comes the trachea, two or three rings of which are above the isthmus of the thyroid body, whilst six to eight rings in all are above the manubrium

sterni. The isthmus of the thyroid body is in adults about half an inch broad and overlaps the third and fourth rings of the trachea leaving a space of about a quarter of an inch between it and the cricoid ; in this region the trachea is opened in *tracheotomy*. When the opening is extended upwards through the cricoid as well as the upper rings of the trachea, the operation is called *laryngo-tracheotomy*. The trachea as it descends from the thyroid isthmus, recedes from the surface. Above the thyroid isthmus the air passage is quite superficial being covered only by skin and fascia and overlapped by the sterno-hyoid muscles, but below the isthmus the trachea is much deeper and more difficult to reach, becoming covered by the sterno-thyroid muscles, inferior thyroid plexus of veins, branches of the inferior thyroid arteries, the thyroidea ima (when present) and sometimes the left innominate vein just above the sternum.

LARYNGOTOMY.

This operation affords the easiest and most rapid way of opening the air passage. It is therefore *par excellence* the operation to be performed on an emergency, as for instance when suffocation is imminent from the impaction of a foreign body at the entrance of the larynx. Under such circumstances a knife should be plunged in immediately above the cricoid cartilage, dividing the skin and subjacent crico-thyroid membrane transversely.

When the operation can be performed deliberately, a vertical incision an inch long should be made in the middle line, opposite the space between the thyroid and cricoid cartilages. The crico-thyroid membrane having been exposed is opened transversely by inserting the knife just above the

upper margin of the cricoid, so as to avoid the crico-thyroid artery and to make the opening as far as possible from the vocal cords. A laryngotomy tube (compressed from above downwards so as to fit the crico-thyroid space) is then inserted and tied in with tapes.

It is but seldom that this operation is required, as when a deliberate operation can be performed it is preferable (for the reason stated below) to perform tracheotomy.

TRACHEOTOMY.

Tracheotomy may be required under the following circumstances.

A. To relieve dyspnoea due to :

1. Diseases causing obstruction to the passage of air through larynx or upper part of trachea, such as laryngitis, ulceration of larynx, tumours of larynx, etc.

2. Foreign bodies, scalds of larynx, etc.

B. For the removal of foreign bodies and tumours.

C. As a preliminary to operations on the mouth attended with risk of entrance of blood into larynx, e.g. removal of tongue, upper jaw, etc. Tracheotomy is preferable to laryngotomy (except in cases of emergency) because :

1. It does not interfere with the integrity of the larynx. After laryngotomy the voice is sometimes impaired or lost, owing to inflammation extending to the crico-thyroid or crico-arytenoid joint, or to contraction of the crico-thyroid membrane.

2. The tube is more easily managed in tracheotomy than in laryngotomy.

3. Subsequent manipulations e.g. for the removal of foreign bodies in the larynx or trachea can be more easily conducted.

4. Laryngotomy is inapplicable in children owing to the small size of the larynx.

The operation may be performed either above or below the isthmus of the thyroid; for the anatomical reasons already stated the high operation should always be performed when possible. Chloroform should be given especially in children as their struggles are apt to interfere with the operator. In adults an anæsthetic is not necessary as, after the first incision, no pain is felt. A small pillow should be placed behind the neck to render the larynx prominent. An incision an inch and a half to two inches long is made exactly in the middle line from the cricoid cartilage downwards; the interval between the sterno-

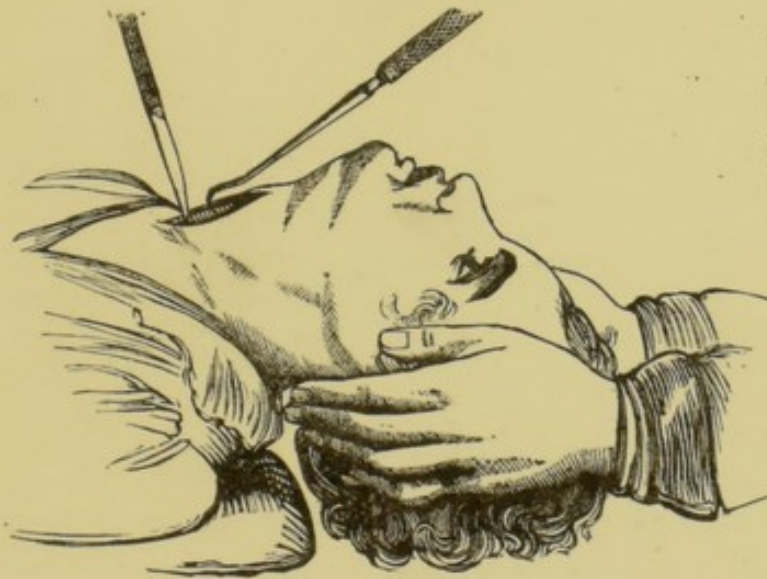


Fig. 65.

hyoid muscles is found, and the dissection carried on between them avoiding, or if necessary, tying any distended veins which make their appearance. The first two or three rings of the trachea and the isthmus of the thyroid will now be exposed.

The latter may be drawn downwards if there is not enough room ; this may be facilitated by dividing the fascia which connects the isthmus to the cricoid ; if necessary the isthmus may be notched or divided in the middle line. The trachea having been clearly exposed and all arterial hæmorrhage arrested, a sharp hook is thrust into it just below the cricoid ; the first two or three rings are then divided with a knife, the back of the blade being directed downwards. (Fig. 65.) The wound in the trachea is held open with the tracheal dilator

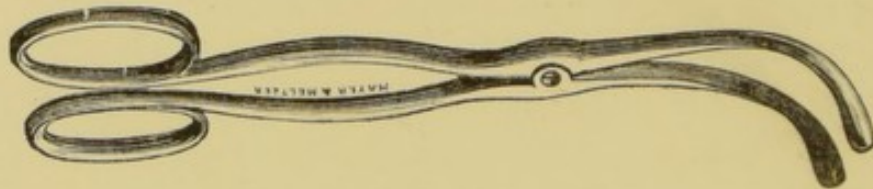


Fig. 66.
TRACHEAL DILATORS.

(Fig. 66.) and the outer part of the tracheotomy tube (Fig. 67)

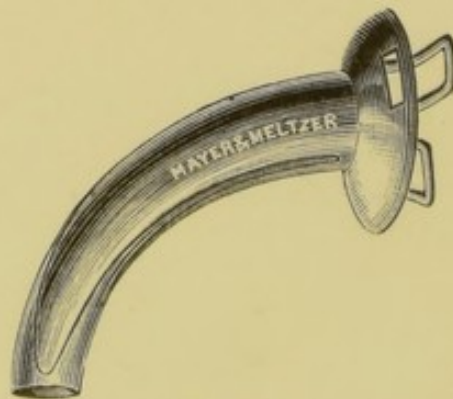


Fig. 67.
TRACHEOTOMY TUBE.

is inserted ; the inner portion is passed in immediately afterwards, and the whole apparatus fixed with tapes tied round the neck.

Difficulties and dangers of Tracheotomy. When

the operator has plenty of time, good light, skilled assistance and an adult patient with a thin neck, no difficulty will be experienced, but under the opposite conditions, great trouble may result in one or more of the following ways :

(1) The hyoid bone or thyroid cartilage may be mistaken for the cricoid in a fat-necked child.

(2) The incision may be too short, embarrassing the later stages of the operation.

(3) Hæmorrhage is always a source of trouble. Arteries should be tied ; veins unless large may be left, as they will cease to bleed when the trachea is opened.

(4) The interval between the sterno-hyoid muscles may be missed, and the dissection carried to one side of the trachea.

(5) The knife may go right through the trachea and enter the œsophagus. The vertebral column has been seen (at a post mortem examination) scored with the knife.

(6) Blood may enter the trachea. This is best avoided by tying all vessels and by thoroughly exposing the trachea before it is opened. Should blood enter the trachea, the patient should be turned over and the head lowered so that it may run out.

(7) The tube may be passed between the trachea and the fascia covering it. This may be avoided by fully exposing and freely incising the trachea before attempting to insert the tube.

After-treatment. The air in the room must be kept warm and moist. The tracheotomy tube should be frequently cleansed. After a few days a rubber tube must be substituted for the metallic one, as the latter is apt to damage the trachea. The tube should be dispensed with as soon as

the normal passage for air has been restored. It is usually advisable to remove the tube for a few hours during the day, before dispensing with it entirely. When a tube has been worn for a long time, difficulty may be experienced in doing without it, owing to adhesion of the vocal cords, granulations in the trachea, or paralysis of laryngeal muscles.

LARYNGO-TRACHEOTOMY.

This operation differs from tracheotomy in that the incision is prolonged upwards through the cricoid cartilage. It is sometimes necessary in children when the space above the thyroid isthmus is not large enough.

THYRO-CHONDROTOMY.

This operation, (often called *Thyrotomy*,) may be required for the removal of a laryngeal tumour or foreign body. An incision is made in the middle line from the hyoid bone to the cricoid cartilage. The thyroid cartilage is then divided accurately in the middle line, great care being taken to avoid injuring the vocal cords. After removal of the growth or foreign body, the lateral halves of the cartilage are accurately sutured together.

SUB-HYOID PHARYNGOTOMY.

In this operation the pharynx is opened by incising the thyro-hyoid membrane. It is very seldom performed.

CHAPTER XXVI.

DISEASES OF THE SALIVARY GLANDS.

XEROSTOMA.

In this affection the secretions of the salivary and buccal glands are greatly diminished or entirely suppressed. The tongue is red, dry and cracked, and the mucous membrane of the cheeks pale, smooth, shining and dry. Mastication, deglutition and articulation are rendered difficult and painful. As a rule, the general health is good.

Very little is known of the pathology of this disease. It is supposed to be due to some affection of the nerve centres controlling the salivary secretion. It is a rare condition, and is most often met with in women with neurotic tendencies.

Treatment. The galvanic current is the only therapeutic agent known to have a beneficial effect.

SALIVATION (PTYALISM).

Increased secretion of saliva is a constant symptom in most of the diseases of the mouth, especially mercurial and ulcerative stomatitis. It also occurs during teething in

infants, during examination of the mouth or throat, and during dental operations. It may result from any local irritation in the mouth, such as biting the tongue, taking irritating particles of food, or chewing tobacco. Certain drugs, such as mercury, iodine, copper and lead produce ptyalism. It is also a symptom of certain affections of the stomach and intestines, and is not unfrequent during pregnancy. It may result from any irritation of the trigeminal or glossopharyngeal nerves, or may be purely hysterical.

The increased secretion is accompanied by a dragging sensation in the region of the parotid glands and masseter muscles, and by a metallic taste in the mouth. The quantity of saliva secreted may amount to several pints during the day. Some of this is expectorated or runs out of the mouth irritating the skin of the lips and chin, and the rest of it is swallowed, often upsetting the function of the stomach and intestines, leading to anorexia, emaciation, etc.

The saliva is nearly always turbid, and may be viscid, or thin and watery; it is often very offensive. Its specific gravity is at first high, even as much as 1050, but later it sinks below normal, even as low as 1001. Its reaction may be acid, neutral, or alkaline.

The treatment consists in removing the cause, and prescribing astringent mouth washes.

PAROTITIS.

Inflammation of the parotid gland may result from injury, concretions in the duct of Stenson, foreign bodies, the effect of cold. It may also occur as a secondary affection after some injury or disease of the abdomen. In most cases parotitis is idiopathic, and is due to infection by a specific micro-organism.

Idiopathic parotitis (mumps) chiefly affects children from 5 to 15 years of age. It usually appears in epidemics, but may occur sporadically ; in any case it is due to infection directly or indirectly from another person suffering from the same disease.

The period of incubation may vary from 3 to 21 days. The disease begins with pains about the ears, a feeling of tension when the mouth is opened and slight febrile symptoms. After two or three days the gland begins to swell and causes great pain in opening the mouth and in chewing. One or both sides may be affected ; the swelling is limited above by the zygoma and below by the stylo-maxillary ligament ; the ear seems raised and forced outwards, and the cheek swollen. The submaxillary and sublingual glands, and even the lymphatic glands and spleen may also become swollen. On the subsidence of the inflammation in one parotid, the other, if not already affected, becomes inflamed. Sometimes the testis, ovary or mamma may be also attacked. Usually only one testis is affected, but sometimes both are involved ; atrophy of the testis and impotence may result.

The *treatment* of an ordinary attack of mumps consists in keeping the patient indoors, giving a laxative, and covering the part with cotton wool or a poppy fomentation.

Secondary or Metastatic Parotitis occurs most commonly as a sequel to typhoid fever, usually during the third or fourth week. It may also follow upon operations involving the abdominal cavity, or injuries of the generative organs.

The symptoms are at first the same as those of the idiopathic variety, but pain is not such a prominent symptom on account of the prostrate condition in which the patient usually is.

The swelling is generally very considerable. Suppuration

frequently occurs and is accompanied by high temperature. As the pus forms, the swelling softens and the skin over it becomes red and glazed ; after a few days the abscess bursts, as a rule upon the face, but sometimes in the external auditory meatus. The process of disintegration may spread from the parotid to the surrounding parts leading to suppuration of the masseters and pterygoids, thrombosis of the adjacent veins and sometimes pyæmia. The facial nerve is often involved, causing paralysis of the muscles of expression.

The occurrence of suppurative parotitis is always serious, and adds to the gravity of the prognosis of the affection it complicates.

The *treatment* consists in early and free evacuation of pus, and the administration of stimulants.

TUMOURS OF THE PAROTID.

Tumours of the parotid are not uncommon, and several varieties are met with ; but there is one tumour so much more common than the rest, that it is known as the "parotid tumour."

The Parotid Tumour contains both connective tissue and epithelial elements. The connective tissue is partly fibrous, partly myxomatous, and partly sarcomatous. Nodules of hyaline cartilage are often interspersed throughout the tumour. The sarcomatous elements vary in amount and in kind ; sometimes there are none, sometimes the cells are few and spindle-shaped, sometimes they are more numerous and oval or round in shape. The epithelial elements bear a more or less close resemblance to the normal glandular structure. Cysts are not uncommon,

and result from liquefaction of the myxomatous tissue of the tumour.

The clinical characters of these tumours vary in different cases. When small they are firm and elastic to the touch, smooth or somewhat lobulated on the surface, of rounded



Fig. 68. PAROTID TUMOUR.

outline and freely movable. As they increase in size they project from the side of the face (Fig. 68), forming a swelling as large as an orange, or even larger. The deeper part of the growth often passes under the jaw and projects into the pharynx or fauces, and comes into relation with the styloid process and its muscles, the carotid vessels and the large

nerves in the neighbourhood. The surface of the larger tumours is usually markedly lobulated and unequal in hardness; in places it is as hard as cartilage, whilst in other parts it may be quite soft or even fluctuating. The rapidity of growth varies greatly; as a rule they grow slowly and may take years to reach the size of a walnut, but at any time they may take on active growth and double their size in a few months.

In addition to the ordinary Parotid Tumour just described, *fibromata*, *myxomata*, and *enchondromata* are also sometimes met with in the parotid.

Spindle-celled and *round-celled sarcomata* are occasionally met with in this region, springing either from the gland itself or from the neighbouring bones or fasciæ. They grow rapidly, soon implicating surrounding parts and often presenting in the pharynx.

Carcinomata of the parotid are fairly common. They are usually of the soft variety (encephaloid), but sometimes scirrhus cancer is met with. These tumours grow very rapidly, are deep-seated and fixed, and very soon involve the skin, which becomes brawny and of a reddish purple colour.

Diagnosis. The most important point is to distinguish between an innocent and a malignant tumour of the parotid. The simple tumour is of slow growth, well-defined, movable, and does not involve the skin, whereas the malignant tumour is of rapid growth, ill-defined, fixed, and soon involves the skin. The only swelling likely to be confounded with a parotid tumour is a chronic enlargement of the lymphatic gland situated just in front of the neck of the lower jaw. Sometimes the diagnosis is very difficult, but the greater fixity of the gland, the presence of tenderness, and the

enlargement of other lymphatic glands will usually suffice to discriminate the lymphatic gland from a parotid tumour.

Treatment. The treatment of tumours of the parotid consists in extirpation with the knife. As a rule no operation should be attempted for the removal of a malignant parotid growth, as nothing short of completely extirpating the whole gland (a difficult and dangerous operation) is of any avail, and recurrence within a very short time is almost certain.

In removing innocent tumours great care should be taken that no lobule or outlying portion is allowed to remain. The skin incision should be made vertically over the tumour, and of sufficient length to fairly expose the whole mass. The deeper dissection should be carried on from below upwards, or from behind forwards, so that one division of the blood vessels may suffice. The facial nerve must be spared as much as possible by working parallel to its branches; a certain amount of facial paralysis is very common after removal of deeply seated parotid tumours.

DISEASES OF THE SUBMAXILLARY GLANDS.

The commonest cause of enlargement of the submaxillary gland is obstruction of its duct by a calculus. This condition has already been described under Diseases of the floor of the Mouth. (See page 184.)

Tumours of the submaxillary glands are very rare. I have on one occasion removed a small tumour from this situation which exactly resembled in microscopic characters the ordinary "parotid" tumour.

I N D E X .

	PAGE		PAGE
Abscess, Acute alveolar ...	31	Carbuncle of lip ...	187
" Chronic alveolar ...	37	Carcinoma of antrum ...	102
" " blind ...	39	" " gums ...	87
" " fistulous ...	37	" " lips ...	190
Acland's splint ...	11	" " palate ...	96
Acromegaly ...	128	" " tongue ...	169
Actinomycosis ...	132	Cancrum oris ...	151
Adenoma of lips ...	189	Catarrhal stomatitis ...	145
" of palate ...	94	Catheterisation of ostium maxil-	
Air passages, Foreign bodies in	204	lare ...	58
" Operations on ...	210	Cementomes ...	77
Ankylosis of temporo-maxillary		Chancre, erratic... ..	153
joint ...	142	" of gum ...	153
Antral perforator ...	61	" " lip ...	153, 187
" syringe ...	61	" " tongue ...	153
Antrum, Cystic disease of ...	98	" " tonsil ...	153
" Empyema of ...	56	Cheek, diseases of ..	192
" Polypus of ...	99	Cleft palate ..	199
" Tumours of ..	98	Closure of jaws ...	141
Aphthous Stomatitis ...	149	Composite odontome ...	82
Arthritis of temporo-maxillary		Congenital defects ...	
joint ...	137	" dislocation ...	21
" " rheumatoid	138	Cysts, dental ...	74
" " suppurative	138	" dentigerous ...	78
" " tubercular	140	" dermoid ...	183
Abresia oris ...	203	" of antrum ...	98
Black tongue ...	163	" " lip ...	189
Blandin-Nuhn gland ...	181	" " palate ...	93
Bronchi, foreign bodies in ...	207	Deformities of mouth ...	193
Calculus, Salivary ...	27, 184	Dental cysts ...	74
" Serumal ...	27	" ulcers ...	166
Cancer of antrum ...	102	Dentigeous cysts ...	78
" " gums ...	87	Dermoid cysts of floor of mouth	183
" " lips ...	190	" " " palate ...	91
" " palate ...	96	Development of mouth ...	194
" " tongue ...	169	" " teeth ...	67
		Diagnosis of tumours of mandible	120
		" " " maxilla	104

	PAGE		PAGE
Diseases of antrum ...	98	Gangrenous stomatitis ...	151
" " cheeks ...	192	Glands, Blandin-Nuhn ...	181
" " floor of mouth ...	181	" Salivary, diseases of ...	217
" " gums ...	178	Gums, chancre of ...	153
" " lips ...	186	" diseases of ...	178
" " mandible ...	114	Gumma of palate ...	155
" " maxilla ...	98	" " tongue ...	155
" " palate ...	91	Gunning's splint ...	10
" " salivary glands ...	217	Gutta-percha splint ...	6
" " tongue ...	164		
Dislocation of mandible ...	15	Hammond's splint ...	8
Dyspeptic ulcers ...	165	Hayward's splint ..	9
		Hare-lip ...	195
Egg-shell crackling ..	66	Heath's Antral Syringe ...	61
Empyema of antrum ...	56	Herpes labialis ...	148
Enchondroma of mandible ...	116	Herpetic stomatitis ...	148
" " maxilla ...	100	Hypertrophy of gums ...	178
" " parotid ...	222		
Epithelial pearls ...	92	Infection from mouth ...	157
" odontome ...	70	Infective panosteitis ...	53
Epithelioma of antrum ...	102	Infra-orbital nerve, Neuroma of	101
" " cheek ...	192		
" " gums ...	87	Jaws (see Mandible and Maxilla).	
" " lip ...	190		
" " mandible ...	119	Laryngotomy ...	211
" " maxilla ...	102	Laryngo-tracheotomy ...	216
" " palate ...	96	Larynx, foreign bodies in ..	206
" " tongue... ..	169	Leontiasis ossea ...	126
Epulis ...	84	Lips, diseases of ...	186
Exanthematous necrosis ...	52	Lupus ...	188
Excision of mandible ...	122		
" " maxilla ...	106	Macrostoma ...	203
" " tongue ...	176	Mandible, dislocation of ...	15
Exostosis of mandible ...	117	" excision of ...	122
Exudative stomatitis ...	148	" fracture of ...	1
		" subluxation of ...	21
		" tumours of ...	114
Fergusson's Saw ...	108	Maxilla, excision of ...	106
Fibroma of gum ...	84	" fracture of ...	13
" " mandible ...	114	" tumours of ...	101
" " maxilla ...	100	Mercurial necrosis ...	49
Fibrous odontome ...	78	" stomatitis ...	149
Fistula, Salivary ...	192	" ulcers ...	168
Fixity of mandible ...	141	Mouth, deformities of ...	193
Floor of mouth, Diseases of ...	181	" development of ...	194
Follicular odontome ...	79	" parasites of ...	160
Foreign bodies in air and food		" syphilitic diseases of ...	153
passages ...	204	" tubercular " " ...	157
Four-tailed bandage ...	5	Mucous tubercles ...	153
Fracture of mandible ...	1	Mumps ...	219
" " maxilla ...	13	Myeloid epulis ...	86

	PAGE		PAGE
Nævus of lip	189	Sarcoma of gum	85
Necrosis of jaws	42	" " mandible	117
Nelaton's method of reducing dislocation of mandible ...	20	" " maxilla	101
Neuroma of infra-orbital nerve	101	" " palate	95
Nigrities	163	" " tooth follicle	118
Odontomes	67	Scorbutic stomatitis	150
Œsophagus, foreign bodies in	209	Serumal calculus	27
Oidium albicans	162	Splints for fractured mandible	6
Oral lamp	59	Staphylorrhaphy	200
Osteoma of mandible	116	Stevenson's oral lamp	59
" " maxilla	101	Stomatitis	145
Ostium maxillare	58	Stomatomycosis sarcinæ	162
Palate, cleft	199	Stromeyer's forceps	20
" diseases of	91	Strumous lip	186
" gumma of	155	Subluxation of mandible	21
Papilloma of gum	87	Syphilitic affections of mouth	153
" " lip	190	" necrosis	54
" " palate	94	" sores of lip	187
" " tongue	171	Teeth, development of... ..	67
Parasitic affections of mouth...	160	Temporo-maxillary joint, dis- eases of	137
Parotid, inflammation of	218	Thrush	161
" tumours of	200	Thyro-chondrotomy	216
Parotitis	218	Tongue, diseases of	164
Perforation of palate	54	" syphilis of	153
Perforator, antral	61	Tonsil, chancre of	153
Periodontitis	25	Trachea, foreign bodies in	207
Periostitis	22	Tracheotomy	212
Pharyngomycosis benigna	163	Transillumination of antrum...	59
Pharyngotomy	216	Tubercular affections of mouth	157
Pharynx, foreign bodies in	205	Tumours of antrum	98
Phlegmonous stomatitis	147	" " gum	84
Phosphorous necrosis	50	" " lip	189
Polypus of antrum	99	" " mandible	114
" " gum	179	" " maxilla	98
Ptyalism	217	" " palate	91
Pyorrhœa alveolaris	26	" " parotid	200
Radicular odontome	76	" " tongue	169
Ranula	181	Ulcerative stomatitis	149
Repair after necrosis	43	Ulcers, aphthous	166
Rheumatic Periostitis	53	" dental	166
Rodent ulcer	191	" dyspeptic	165
Saccharomyces albicans	162	" mercurial	168
Salivary calculus	27, 184	" Rodent	191
" fistula	192	" of tongue	164
" glands, diseases of	217	Uranoplasty	201
Salivation	217	Vascular tumours of gum	86
		" " palate	93
		Wharton's duct, obstruction of	184
		Xerostoma	217



