On diseases of the jaw : with a brief outline of their surgical anatomy, and a desription of the operations for their extirpation and amputation, with cases and illustrations / by Richard O'Shaughnessy.

ON

DISEASES OF THE JAWS,

WITH A BRIEF OUTLINE OF

THEIR SURGICAL ANATOMY,

AND

A DESCRIPTION OF THE OPERATIONS FOR THEIR EXTIRPATION AND AMPUTATION,

WITH

Cases and Illustrations,

BY

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CALCUTTA:

PRINTED AT THE BAPTIST MISSION PRESS.

PUBLISHED BY W. THACKER AND CO. ST. ANDREW'S LIBRARY.

1844.

TO THE

STUDENTS AND GRADUATES

OF THE

MEDICAL COLLEGE OF BENGAL,

THE FOLLOWING PAGES

ARE DEDICATED BY,

THE AUTHOR.

PREFACE.

I AM induced to offer this little Essay on diseases of the Jaws to the Students and Graduates of the Medical College, as there is no separate work published on the subject, and no single book containing all the information which the young practitioner ought to be in possession of, before proceeding to perform any of the bold operations required, for the removal of some of the diseases herein described.

Not much more than twenty years have elapsed, since the operation for removal of the jaws, was first practised in Great Britain; and even Sir A. Cooper, and all other English Surgeons, used to allow patients to die, in the wards of their hospitals, of similar diseases to those which are now so successfully treated

by operative procedure, without making even an attempt to save them. It is not more than eight years ago, since, on visiting a certain Surgical Hospital in this city, I saw an unfortunate man crouched in a corner of the principal ward and groaning bitterly, on whom "the sentence of disease for life" had been passed, as he had been told there was no remedy for his disorder. This, on approaching him, I found to be an enormous tumor of the lower jaw, but in every respect a favourable case for an operation; there being no marks of malignancy about it, and the man as yet not much wasted in flesh or strength. But the accomplished Physician who then attended this Institution, had not devoted as much of that talent and energy for which he was so distinguished, to the science of Surgery, as he did so successfully to the study of other branches of his profession, and consequently he did not appear even to have contemplated the possibility of saving the poor man's life. In the course of a few months this

patient died from suffocation, produced by the pressure of the diseased jaw upon the throat, and the preparation of the head and inferior maxilla is now in the museum of the Medical College.

I do not mention this case as any disparagement to the gentleman alluded to, for he well may have passed over those cases which, when he was a student, his masters taught him by their example, to look upon as past surgical skill, but to point out to those to whom this is dedicated, the necessity on their part, when placed in charge of surgical institutions, to be prepared for every operation, no matter how formidable its nature.

All the cases of diseases of these bones, which I have seen since I came to India, were in patients presenting themselves at the dispensary, which, under the Governors of the Native Hospital I superintend. As the students of the College, when they become graduates, are dispersed all over the country, and placed in charge of similar institutions by

the Government, there can be little doubt but that similar cases will come to them for relief, and I trust they may not apply in vain. It requires but the knowledge they all possess when leaving the college, and a little firmness and determination, to undertake these, and all other surgical operations which they may be required to perform.

Should I be so fortunate as to know hereafter, that this little book has afforded assistance, or given additional courage and confidence, (such as I gratefully acknowledge to have received myself, from the perusal of Mr. Liston's paper on diseases of the upper jaw, when I was about to perform my first operation on that bone,) to any member of my profession, I shall deem myself amply rewarded for any time or trouble its production has cost me.

R. O'S.

Calcutta, December, 1844.

DISEASES OF THE JAWS.

TUMORS OF THE JAWS

REQUIRING

EXCISION OR EXTIRPATION.

Diseases of the Jaws are about the most formidable with which the Surgeon has to contend. But a few years have elapsed since those affections, which, from the bold and almost uniformly successful operations performed for their cure, are now looked upon as the greatest triumphs of modern Surgery, were held to be hopeless from the commencement. The unfortunate patients so afflicted, as a matter of course, were abandoned to their fate, or subjected to useless operations, which, by attacking the disease itself in vain attempts to tear it from its bed, failed in their objects, and the tumors grew again with increased rapidity and pain. The result of such proceedings was, of course, the cause of disappointment to all, and

no slight discredit to operative surgery. Similar operations, it is true, may still be performed with success; but it is only when the tumor is small and circumscribed, fibro-cartilaginous in its nature, and of the truly benign form of this growth, that we have any chance of being successful by merely removing the diseased mass, without at the same time taking away the bone from which it springs, by cutting through healthy parts external to the tumor. (See case iii.)

But notwithstanding the great success which has attended the bold operations performed of late years for the removal of maxillary tumors, there are unfortunately some forms of disease which attack the bones of the face, of so peculiarly malignant and deadly a nature, as to defy all remedial measures, none of which can retard or remove them permanently, when once the constitution has been blighted by the peculiar diathesis, which is in fact their root and origin.

Fortunately, however, the malignant form is comparatively rare in India, and therefore the great majority of those Tumors of the Jaws

which we meet with, are such as a skilful Surgeon, who knows his profession *practically*, may undertake the cure of, with every reasonable hope of a successful issue; provided the health, and constitution of the patient, are at the time in a proper state, to admit of the necessary operation.

The diseases to which the jaw-bones are subject, and which may be removed with every prospect of effecting a permanent cure, by excision, or amputation of a portion or the whole bone involved, are, *Fibro-cartilaginous tumors,—Osteo-sarcoma—Spina Ventosa*—and *Exostosis.*

I shall now proceed to give a short description of the origin, progress and Pathology of each of these diseases.

The Fibro-cartilaginous tumors

Are found in both the superior and inferior maxillary bones, but most commonly in the former, where the disease appears to commence in the mucous membrane lining the antrum. They are described as being excessively slow in their progress, producing no

pain in the beginning, and ultimately only causing pain by pressure on the surrounding parts. The figure of these tumors is generally spherical; they are remarkably smooth and regular on the surface, except within the mouth, where, when the tumor is very large, the teeth of the lower jaw make a deep furrow for their lodgement. The internal surface is covered with the mucous membrane of the mouth, and the teeth of that side all fall out or project irregularly from the tumor. In some cases they are found imbedded in the diseased mass itself.

The *Fibro-cartilaginous* tumor may grow to an enormous size, in fact there is no limit to the bulk it may increase to, before destroying life. It may kill the individual either by pressing upwards through the orbit upon the base of the brain, or by growing backwards into the mouth so as to impede deglutition, produce suffocation, or wear him out by the constant irritation its presence produces, as happened in the case of Sarah Dulwich, related by Sir A. Cooper in his "*Surgical Essays.*" She was admitted into Guy's Hospital in the

year 1812, with a fibro-cartilaginous tumor of the lower jaw, which "continued to increase until it became of most enormous size, measuring five inches and a half from side to side, and four inches from the incisor teeth to its anterior projecting point. The circumference of the swelling was sixteen inches, and less than half the tumor after death, deprived of the integuments, measured seven inches and a half.

"*At length it pressed the epiglottis upon the rima glottidis, so as to occasion difficulty of breathing, and this source of irritation produced the destruction of life.*"

The progress of this disease is said to be (as before stated) remarkably slow, but judging from the instances I have met with, I do not look upon that, as one of its most remarkable characteristics in this country. In Europe it seldom appears to arrive at any very great size till after the lapse of several years from its commencement, but one of the tumors removed by me was as large as any of the published cases with which I am acquainted, although it was the growth of less than one year; and many other cases met with in my

practice, had also obtained a great magnitude in the course of a few months. All the instances of this disease which I have seen, were in young persons, but the majority of those reported by Liston aud others at home, were in persons past the middle period of life. This may in some measure account for the difference in the progress of the tumors, as doubtless the bones yield more readily to the pressure of the substance within, when young, than they do when the earthy matter predominates over the animal as is the case in old bones. The absorbents are also more active in young persons than they are in those advanced in life, and therefore all opposition to the expansion of the tumor is more readily removed.

It is remarkable that decayed teeth should be so invariably referred to as the cause of these growths by European Surgeons, yet in no instance could I trace the affection to that cause in this country, where the natives generally have sound teeth, as was the case in all the individuals with fibro-cartilaginous tumors who presented themselves to me.

Injuries of the bone are also set down as com-

mon predisposing causes by European writers on the subject, and no doubt they are very frequently the origin of such tumors, as anything likely to set up inflammation in the bone may produce the disease; the deposition of fibro-cartilage of course depending upon some peculiarity in the constitution of the individual at the time. The contents of these tumors are one uniform solid mass, resembling the common elastic ligament of the body, with polished scales and points of bone dispersed through its substance, the whole being surrounded by a shell of bone, or a thick covering of condensed cellular membrane.

I look upon this disease as benign from the commencement, and that it never does at any stage exhibit a malignant character.

Osteo-sarcoma

Commences in the internal or cancellated structure of the bone, sometimes coming on spontaneously, and at others, produced by an injury of the part or a carious tooth. As the disease advances the teeth loosen and drop out, the laminæ of the bone yield to the

pressure of the tumor within, and give exit to a mass which grows into the mouth, forcing back the tongue, so as to interfere with deglutition, and it distends the skin externally, producing in the advanced stage a frightful deformity. The progress of the disease varies in different individuals, in some it is rapid, in others remarkably slow. The pain is not generally very acute, indeed, it is usually described more as a dull uneasiness, till like the fibro-cartilaginous tumor, the swelling becomes so large as to produce pain by pressing on the neighbouring parts. The skin covering this tumor is more or less thinned according to the size it has attained; it does not adhere to the diseased mass, and it is free from fungoid growths and fœtid discharge.

Such are the characters of the benign form of this disease, the form which alone it is safe for the surgeon to meddle with. The interior of such tumors presents a great variety of structure. In the early stage it is chiefly fibro-cartilaginous, or at least a substance resembling that structure, but on examination

it is not found to possess either its firmness or its strictly fibrous nature. In cases where the tumors have grown to a considerable size, they are found on being cut into, to consist of a number of cells containing matter of various appearances, so as to resemble broken down brain, grumous blood, and a chocolate-colored fluid, interspersed with thin plates of bone and earthy matter, the whole being free from offensive odour. The walls of the cavity are formed almost entirely of a cartilaginous structure, with bone here and there; but in large tnmors the bone bears a very small proportion to the cartilage.

It is difficult in the commencement, to distinguish the unhealthy from the benign forms of this disease, but as it advances, its rapid growth, accompanied by excessive pain, the fungoid bleeding excrescences which protrude from the ulcerated skin, the skin adhering to and incorporated with the subjacent mass, the offensive discharge of serum tinged with blood which exudes from it, the peculiar expression of the countenance, and the altered health, point out the deadly nature of the disease, and

should serve as a warning to the surgeon to guard him against expressing too favourable an opinion, or rashly to attempt, or advise a worse than useless operation. Surgical interference in such cases only hurries on the fatal catastrophe.

Spina Ventosa.

This disease also attacks both the upper and lower jaw, but it is most frequently met with in the lower. It is described as a hollow shell of bone, produced by inflammation commencing in its internal structure, where matter is deposited and the cancelli gradually broken down and destroyed. The walls of the bone become expanded, attenuated and ultimately yield to the pressure of their contents. The deformity produced, though seldom so great as in the fibro-cartilaginous and osteosarcomatous tumors is frequently very considerable. This disease is said to be generally caused by enlarged and diseased cysts at the roots of unsound teeth, which by their pressure produce inflammation in the medullary membrane of the bone. In

the commencement the pain is constant and acute, which lasts so long as the inflammatory stage continues, but when that subsides the pain usually ceases, and the tumor becomes stationary. It sometimes, however, occurs that the tumor rapidly enlarges to an enormous size, accompanied with great constitutional disturbance, but when that is the case the general health of the individual is bad from the commencement, and he dies cachectic.

The contents of these tumors is a glairy, jelly-like fluid, mixed with thin serum and pieces of bone, like fragments of honeycomb; when the tumor is a large one, the walls are composed of attenuated bone, with large holes here and there, covered over by a strong membrane which preserves the contents from being extravasated. This, however, is not always prevented, as occasionally the matter contained in the tumor escapes into the surrounding cellular tissue, from the yielding or absorption of its walls.

The surface of the tumor is remarkably smooth, uniform, and hard, except where absorption has taken place in the surrounding

shell, where the finger sinks into a pit or hole, bounded by a sharp edge of bone. It is perfectly insensible, and may be even roughly handled without producing pain.

This disease may be cured in the early stage, sometimes by merely extracting a tooth, if produced by disease at the root of that body, or by making a free opening into the cavity so as to give exit to its contents. A seton passed through the tumor will sometimes effect a cure after a simple opening into it has failed; but occasionally it is necessary. to make a long incision over the base of the expanded bone, in order to expose its walls that they may be broken down and removed. When the entire of one side of the lower jaw, processes and all, are involved in this disease, I think the simplest and best plan is to saw through the bone where it is healthy and solid, and remove the diseased mass by disarticulating it; the patient will recover more rapidly and certainly after such an operation, than he is likely to do, when the parts are but partially removed, as is generally the case when the surgeon contents himself with breaking

down and removing the walls piece by piece, as some writers on the subject recommend.

Exostosis

Is divided into true and false; by the former, is denoted a formation of a truly osseous substance, sometimes hard as ivory, slow in its progress, and not accompanied with any very great amount of pain, except when it presses upon a nerve or some important organ. By the latter is understood an irregular spongy expansion from a bone, containing substances of various colors and consistences resembling fat, broken down brain, serum, coagulated blood, and cartilage with spiculæ of bone projecting throughout the mass. But this division also includes Osteo-sarcoma, and Fibro-cartilaginous growths which being considered under seperate heads, I shall merely confine myself to a description of the true Exostosis.

This disease frequently attacks the body of the lower jaw, and is met with though rarely in the superior Maxillary bone. It may commence in the medullary membrane or be-

tween the internal surface of the periosteum and the outer lamella of the bone, consequent on inflammatory action, which causes a substance to be effused, which by becoming organised forms a nucleus for the new growth. The consistence of this may vary, from that of soft cellular bone, to that of the hardest ivory. The disease is not a painful one, and does not in general reach any very great magnitude; it may appear at any age but most usually commences in the adult period of life. The surface of the tumor has an irregular nodulated appearance, generally largest at the base, but occasionally it grows by a narrow neck from the parent bone. Exostoses rarely occupy the whole thickness of the bone with which they are in connection.

On making a section of the tumor and the bone, the cancellated structure of the latter can be traced into it in some instances, while in others the tumor is evidently a deposition formed on the bone (to which it firmly adheres,) by a similar process to that which preceded the formation of the fœtal skeleton, viz., the shedding of a glutinous matter, which becomes

dense, cartilaginous, and organised, into which blood vessels shoot, and deposit the osseous matter.

The teeth of course are displaced or shed when the tumor becomes large, the countenance is more or less distorted, and the actions of the jaw are deranged.

The causes of this disease are commonly injuries or pressure on the part, but occasionally it is only to be accounted for, by the peculiar disposition in the constitution of the individual to deposit bone.

Epulis.

Besides the foregoing disorders to which the jaws are subject, there are others of a less formidable nature to which I have not as yet alluded. The first of these is called Epulis, but, as I have seen only a few instances of it myself, in this country, I shall take the liberty to quote the description given of this disease by Mr. Liston in his admirable paper on the Mouth and Jaws* "The

* See Medico Chirurgical Transactions, vol. xx. p. 167.

epulis, a solid growth from, and of the consistence of the gum, first appearing between the teeth, adhering firmly to the periosteum around their necks, and gradually spreading itself in the same structure, often attains a troublesome and alarming size; the deeper parts become involved, the alveolar processes, the periosteum of the sockets and teeth; these latter are loosened, separated and projected; the section of such tumors often exhibits spiculæ of osseous matter shooting into dense fibrous structure which adheres to the surface of the bone. Its seat is generally in front of the mouth and in the lower jaw, but occasionally it is met with in parts investing the molares. It seems to originate from disease of the teeth, from crowding or irregular distribution of these bodies, from injury accidental or inflicted in ill-directed operations for the removal of the teeth,—the bruising of the gum, for instance, by the bolster of the old key instrument or pelican. But the disease is occasionally met with where the teeth are sound, have room enough for their development, where no injury has been received, and

in fact without any assignable cause. These are not generally, 'tumores mali moris,' though occasionally they do degenerate, contaminate the neighbouring parts, and are liable to be reproduced, and sometimes after some interval from their apparently complete extirpation."

These tumors may be removed with the knife, when superficial, and confined to the gums and surface of the bone. The application of the actual cautery, or some strong caustic to the seat of the removed tumor, is frequently employed, in order to prevent a return of the disease. When the bone is involved, the cutting pliers must be had recourse to, to remove the unhealthy parts; but of course the operation has to be planned according to the seat and size of the tumor. When situated in front of the mouth, and particularly if in the lower jaw, there is generally no necessity for cutting through the lip in order to remove this disease.

Exfoliation.

The lower jaw-bone is also sometimes the seat of extensive exfoliation. When the dead

bone is cast off from the living, it acts as a foreign body, matter is formed, and a fistulous opening is established; a probe may be passed through this opening, sometimes for its whole length along the side of the jaw. The probe is felt to grate against the denuded bone, and if the latter has been completely detached, it may be moved about with a forceps, or the end of the probe, introduced through the opening. The surrounding soft parts become indurated, and greatly thickened, and this state of things may continue for years, if the dead bone is not removed. This may sometimes be done through the opening already existing, but when the exfoliation is extensive, it is necessary to make a free incision over the diseased bone, through the thickened parts which cover it. A single cut is generally enough, and as the dead bone has no attachments, little or no dissection will be required to enable the surgeon to remove it. I have taken away the entire of the external plate of one side of the base of the lower jaw, in this way, on several occasions. The tumor

caused by the presence of the dead bone in one or two instances, was equal to that described in case IV, but the patients recovered perfectly in the course of ten days, or a fortnight after the operation. All discharge ceased immediately, and the swelling subsided rapidly so as to remove all deformity.

Abscess in the Antrum Maxillare.

The cavity of the antrum is occasionally the seat of Abscess, sometimes produced by diseased teeth, or old stumps, particularly the first and second molares, and second bicuspis, which from their vicinity to that cavity, set up inflammation in its lining membrane. Blows on the cheek are also frequently the origin of abscess in this region, and if the individual is in a delicate state of health, long exposure to cold, or inclement weather, may bring on an attack of inflammation of the mucous lining of the antrum, which may also block up the opening between it and the nose, and thereby prevent all exit of the fluid, which the inflamed membrane pours out in great abundance. The distention and pressure thus pro-

duced, becomes a source of fresh irritation, and so the inflammation is kept up, and more matter daily effused. Catarrh, or inflammation of the schneiderian membrane of the nose, occasionally appears to extend to the mucous membrane of the Antrum, which explains the dull, heavy pain, so often felt in that cavity, by persons suffering from what is usually called a cold in the head, and it indicates the possibility of an abscess in this region, being caused, by the spread of inflammation from the mucous lining of the nose, by continuity of structure.

The symptoms of acute inflammation of the lining membrane of this cavity, which usually precedes suppuration, are a dull heavy pain, in the commencement, which afterwards changes into a sharp lancinating sensation, shooting in all directions through the bone, and coming on occasionally in regular paroxysms. This is accompanied with more or less tumefaction of the face, and tenderness of the surrounding parts. Ultimately the bone becomes expanded, and the cheek so swollen, as to produce considerable deformity. When the expansion of

the bone takes place towards the roof of the mouth, the teeth become displaced and loose, the gums thickened, soft and spongy, and sometimes they even assume a fungoid appearance. Fever, and general constitutional disturbance, accompany these symptoms, and great mischief may be done if the necessary steps are not taken to give exit to the pent up matter. The walls of the antrum may become affected with caries, or some portion of them become absorbed, or exfoliate, and the contents effused into the surrounding cellular tissue; an ulcer is then established, either in the cheek, the side of the nose, or mouth, and a fistulous opening is formed, which, the continued flow of the natural secretion of the membrane, may keep open, long after all the morbid matter has drained away. Sometimes the pus finds a partial outlet by the sides of the teeth, but it is not followed by any relief to the patient, and the disease is not retarded by it in the least.

A chronic collection of matter in the antrum, is sometimes found, without any previous symptoms occurring, sufficient to attract the attention of the patient. It comes on very

slowly, and the deformity produced by the expanded bone, first calls the attention of the individual to the circumstance. There is no pain felt on pressure, and no inflammation of the surrounding soft parts. The tumor is even and uniform, and the anterior wall of the antrum which becomes as thin as parchment, yields to the pressure of the finger and returns to its former shape by its own elasticity.

In the acute form of this disease, all the usual means to allay inflammatory action must be had recourse to, the mouth being first examined to ascertain if bad teeth, or decayed stumps are likely to be the cause, which, if found to be so, must be removed at once. Hot water fomentations frequently employed, and leeching the gums, will be found of great advantage, in relieving pain, and subduing inflammation ; but should all fail to prevent the formation of matter, the only way to afford relief is to make an opening for its exit. This may be done by boring a hole through the alveolar process into the antrum, after extracting one or more teeth, or stumps, if they are diseased

and require removal, but if all the teeth at that side, are healthy, a sound one should not be drawn, but an opening may be made through the anterior wall of this cavity, by dividing the mucous membrane of the upper lip immediately above the alveolar processes of the external grinders, and then applying the perforator to the anterior and lower surface of the malar eminence. The perforator is a triangular-shaped instrument, not unlike the stilette of a trocar, but without the shoulder which that instrument has, indeed a common tapping instrument would answer the purpose very well, if a regular perforator was not at hand. The hole should be made large enough to admit the top of the finger, otherwise it would soon get obstructed.

After the discharge has continued for some time, injections of a weak solution of alum, or zinc, may be forced into the antrum, to check it; nitrate of silver, two to four grains to the ounce of distilled water, will sometimes be found to produce this effect, and restore healthy action, when all other applications have failed. Tinct. of myrrh, and sulphate of

copper, are also recommended for this purpose.

The contents of these abscesses, are generally a white, curdy or flocculent matter, mixed with pus; the flakes of this substance are sometimes so solid, as completely to block up the natural opening in the nose (if not already closed by the thickened mucous membrane) and also the artificial opening through the alveolar process or anterior wall. It is therefore necessary to inject warm water with considerable force into the antrum occasionally, during the progress of the treatment.

Abscess on the side of the Lower Jaw.

It sometimes happens that an abscess forms on the side of the inferior maxilla, either internally, between the cheek and gums, or externally, near the symphisis of the chin, or on the side of the bone close to its angle. This is at first frequently taken to be a common collection of matter, which when opened, and emptied, is expected to heal in the usual way, but a sinus forms, and continues to discharge through a fistulous opening. If the patient

happens to apply to a medical man who is ignorant of the cause of this disease, the chances are he is subjected to a variety of treatment, for scrofula, caries of the jaw, &c. when by merely extracting a tooth it might be cured in a few days. The crowded state of the teeth, causes inflammation in the periosteum and sockets of these bodies, and until room is made by extracting one of them, the discharge continues. These abscesses generally form in persons about the age of from nineteen to twenty-four, when the wisdom teeth are coming forward. It is not in general of much consequence which of the teeth in the neighbourhood of the fistula is extracted, but whether the teeth are sound, or unsound, one must be taken out before the discharge of matter ceases, which it usually is found to do, in a day or two after the tooth is drawn, although it may have existed for years previously.

The cancerous and fungoid growths, which are occasionally seated in this region, in persons of a peculiar Diathesis, I do not think I need say much about, as I profess to treat merely of those diseases which admit of cure

by surgical interference. Besides those dreadful disorders, are so well known, and so ably described, in most of our standard works on surgery, that I feel it to be quite unnecessary for me to give a minute description of their symptoms, appearances or pathology. I shall therefore content myself with quoting the following description from John Bell's "Principles of Surgery" of the fungoid form of this dreadful malady. "The gums and lips give rise to tumors which are indeed slow, firm, indolent and void of pain in their early stages, but in their latter stages of unparalleled malignity, assuming usually a fungous form; and, when the firm and indolent tumor thus bursts out into a fungous efflorescence, its growth is so rapid, that I know nothing to equal it, not even the fungus of the brain! it rises à vue d'œil, you almost see it grow, and when extirpated partially, it sprouts up again before the blood of such imprudent incisions is dried up." Such are the tumors which surgeons formerly used to attempt to remove, even in the most advanced stages, by tearing them out piecemeal with the forceps and

gouge, and then, by way of climax to such cruel proceedings, the red hot iron was freely applied to the surface of the seat of disease, with the hope of destroying its root, and of preventing thereby its return, a desideratum, unfortunately, almost never attained.

It would be of incalculable advantage if there were some *certain signs or symptoms,* by which we might be able to distinguish, the malignant forms of tumors of the jaws, in their early stages, but unhappily we know none which may not occasionally apply equally, to the most healthy forms, except that single circumstance of the altered health, which invariably accompanies a malignant disease, no matter what part of the body may happen to be its seat. Pain and rapid growth are laid down by some writers as sure signs of malignancy, but such is sometimes the progress of healthy tumors, while some of the most deadly are neither rapid in their progress (for a time at least) nor very painful in their nature. When the disease is advanced, the symptoms before described in page 9, put the character of the disorder beyond all doubt.

In the onset of the disease, if the appearances are such, as to lead one to fear that the tumor is unhealthy, the question then to be decided is, as to the propriety of performing an operation under such circumstances, or of abandoning the patient, to the inevitable death in a frightful form, which the disease, if allowed to proceed, is certain to produce. If I was consulted in the very earliest stage, before the skin or surrounding bones were contaminated, and the patient in other respects in a favourable state, I would not hesitate to advise an operation; and as no time in such cases is to be lost, I would *urge* the patient to submit to it without delay; telling him fairly, that it gave him but a chance, as the tumor was likely to return, that, that chance however, was his only one, and if he delayed in taking it, the time would soon be passed, when I could offer him even so much. The result of such operations, when performed under apparently most favourable circumstances, has been unsatisfactory, as in the majority of cases, the disease returned, with increased malignancy. But as there are in-

stances on record of success following the operation in the early stages of the disease, reported by Desault, Sir A. Cooper and Mr. Liston, the truth of which cannot be doubted, the surgeon I think is bound to endeavour to save the patient by an operation, as that proceeding alone offers a hope of recovery to the individual so afflicted.

In the foregoing pages, I have attempted to give a brief sketch, of the principal diseases of the jaws, for which both the superior and inferior maxillary bones have been removed, with almost uniform success for several years past. I now propose to give a short description of the different methods of performing these operations, but previously to doing so, I think it well to give the chief practical points in the anatomy of the parts involved; without a perfect knowledge of which, it is impossible for the surgeon to make all his plans, with that precision and clearness, so essential to the dexterous and successful performance, of these and all other important operations.

ANATOMY OF THE JAWS.

The Superior Maxilla.

The superior maxillary bone is the principal bone of the face, it extends upwards to the orbit, the floor of which it partly forms; inferiorly we find it in the roof of the mouth and floor of the nose, internally it sends up a process which forms the side of the nose, and externally, it projects outwards to join the malar bone, and complete the anterior boundary of the temporal fossa; anteriorly it is covered by the muscles and parts which constitute the cheek, and posteriorly it bounds the pterygo maxillary fossa. Anterior to the palate process, is a semicircular, rough, irregular ridge, in which are the alveoli, or sockets of the teeth. The bone is hollow in the centre, containing one large cavity, the antrum highmorianum. The superior maxilla is con-

nected in the middle line with its fellow of the opposite side; by the ascending or nasal process, with the os frontis, os unguis, and nasal bone; by the orbital process with the os unguis, os planum of the æthmoid, and the palate bone; and with the malar bone externally, both by its orbital and malar processes. Posteriorly it enters into the spheno maxillary fissure, and joins the palate bone and pterygoid processes of the sphenoid.

From the above sketch of the situation and connexions of the superior maxilla, it is plain, that to remove the bone entire, it must be separated internally from its fellow of the opposite side. The nasal process must be divided in order to separate it from the nasal, frontal, and ungual (or lachrymal) bones. Externally the malar must be cut through into the spheno-maxillary fissure, and posteriorly the palate process has to be separated from the palate plate of the palate bone; after which no bony attachments remain to prevent its removal from its natural bed, a slight shake or pressure being all now needed for its complete extraction, in the dry bone.

The levator muscles of the upper lip, are attached to the anterior surface of this bone, and between these muscles, we find the superior maxillary nerve after it escapes from the infra-orbital canal, through the foramen, situated immediately below the edge of the orbital process. We also find in this situation numerous branches of the Portio dura, or facial nerve, some of which run parallel to the duct of Steno, and the transverse facial artery, as they cross the outer surface of the masseter muscle. The duct runs from the parotid gland to the cheek, in a line corresponding to one drawn from the tube of the ear, towards the tip of the nose, the artery lies superior to the duct, and the nerve surrounds it. Between the buccinator and masseter muscles a large quantity of fat is deposited. Steno's duct perforates the buccinator muscle, and opens into the mouth opposite the second last molar tooth of the upper jaw. The superior coronary, lateral nasal, and angular arteries are also met with, as the upper lip, ala of the nose, and internal canthus of the eye are being dissected. The buccinator

muscle is attached to the outer surface of the alveolar processes of the two last molar teeth, behind which, the external pterygoid muscle is attached; and the superior dental, infra-orbital, and nasal arteries are given off by the internal maxillary, as it is winding its way towards the pterygo-maxillary fossa. The descending branch of Meckel's ganglion, the posterior palatine nerve, is lodged in the posterior palatine canal, situated between the maxillary and the palate bones.

The Malar,

Or cheek bone, is of an irregular square form, presenting flat surfaces, and sharp edges and angles, situated on the upper and external part of the face. It is attached superiorly to the frontal and sphenoidal bones, externally by a long thin projection to the zygomatic process of the temporal bone, with which it completes the zygomatic arch, posteriorly it projects into the orbit, forming, its outer wall, and internally it joins the malar process of the superior maxilla. This bone forms the anterior and partly the internal boundary of the spheno-maxillary

fissure. Its anterior aspect is convex and covered by the orbicularis palpebrarum, its inferior border gives origin to the masseter muscle, and its upper edge has the temporal fascia attached to it.

The posterior surface is concave and smooth, where it forms the anterior boundary of the temporal fossa.

The reader will perceive, on reviewing the above description of the general anatomy, of the bones and parts involved in the diseases, requiring extirpation of the upper jaw, that there are no large arteries, at all likely to be wounded in the operation. The only branches of any consequence being, the superior coronary and transverse artery of the face anteriorly, and some branches of the internal maxillary posteriorly. These arteries, though none of them of a size to deter, even the most timid operator, from performing an operation in which they may be involved, become still smaller, and less likely to cause troublesome hœmorrhage, when large tumors have pressed upon them for any considerable time, as happens when the antrum

becomes the seat of great fibro-cartilaginous growths. Indeed, in such cases, on the removal of the tumor, no bleeding follows, in consequence of the total obliteration of the majority of these vessels. So that the greater the growth, (it being of the truly benign character,) the less cause, has the surgeon to apprehend troublesome hœmorrhage during the operation.

The nerves divided in this operation are branches of the portio dura, and superior maxillary.

The Inferior Maxilla

Is a single bone of a horse-shoe or parabolic form. It is usually divided by anatomists into a body, angle, and processes. The horizontal portion, between the masseter muscles, is the body, the posterior or ascending division the rami, and that portion of the bone, between the body and the process, which is covered externally by the masseter, and internally by the internal pterygoid muscles, is called the angle.

The body of the bone is covered anteriorly

by the common integuments, platysma myoides, depressor muscles of the lip, and angle of the mouth. The buccinator muscle, and mucous membrane of the lips and cheek, being also attached to this part of the bone. To the internal surface is attached the mylo-hyoideus, genio-hyoideus, hyo-glossus, genio-hyo-glossus muscles, and the anterior belly of the di-gastric which is attached to a fossa close to the middle line, immediately anterior to the origin of the genio-hyoideus. The mucous membrane of the mouth is attached to the bone internal to these muscles, and the sublingual gland is covered by it, as it rests on the mylo-hyoid.

The arteries which ramify on the anterior surface, are the labial, and inferior coronary branches of the facial. The inferior dental branch of the internal maxillary artery, runs through a canal in the substance of the bone, and the submental, and sublingual branches of the lingual arteries, course along its inferior border and inner side.

The gustatory and lingual nerves, are at some distance from this part of the bone, but the third branch of the fifth (the inferior

maxillary) accompanies the artery through the dental canal and escapes with it through the anterior mental foramen, when it ramifies on the chin.

The angle of the jaw is covered externally by the common integuments, and masseter muscle; the parotid gland overlaps the muscle in this situation. Internally by the insertion of the internal pterygoid, a little anterior and internal to which the submaxillary gland is lodged.

The rami of the lower jaw are two processes which rise perpendicularly from the angle on either side. The anterior is the coronoid process, having a sharp edge terminating in a point, which is lodged beneath the zygomatic arch. The posterior process terminates superiorly in a smooth rounded surface covered with cartilage called the condyle, surmounted on a narrow neck, and lodged in the condyloid, or glenoid fossa of the temporal bone, to which it is connected by means of a loose capsular, and two lateral ligaments, and an interarticular cartilage. The coronoid process is grasped by the temporal muscle, which is inserted by

its strong tendon into the edge, and posterior surface of this process, and by a few fibres into the anterior or external surface also. This part of the bone is entirely covered by the masseter muscle.

The parotid gland which overlaps the posterior edge of the masseter muscle, is situated between the tube of the ear, and ramus of the jaw, posteriorly a small portion of it insinuates itself under cover of the angle of this bone. The portio dura nerve enters the parotid gland, and divides into wide spreading branches in its substance. The external carotid artery passes through it, and lies almost in contact with the edge of the bone, parallel to which it runs, as it ascends towards the temple, to divide into its ultimate branches.

As the carotid artery is lying in the parotid gland, about half an inch from the condyle of the jaw, it gives off the internal maxillary, which passes inwards between the internal lateral ligament and the bone. Here the artery sends off the inferior dental and middle meningeal. When the jaw is depressed, the angle lies close to the bifurcation of the common

carotid artery. The submaxillary gland lies under cover of this part of the bone, where it is separated from the parotid by the stylo-maxillary ligament; sometimes a slip of gland connects the two. Behind and below the maxillary gland we find the styloid muscles, the gustatory and lingual nerves, and deeper still the jugular vein and pneumo-gastric nerve.

In amputation of the inferior maxilla a greater number of large arteries are divided, and endangered, than is the case in extirpation of the upper jaw. The facial artery is almost invariably cut through, when any great extent of the side of the base of this bone, has to be removed. The submental branches of the lingual, and the dental branches of the internal maxillary, are also cut across, and when the disease requires the disarticulation of the condyle, the transverse facial is always, and the internal maxillary itself is sometimes unavoidably wounded.

OPERATIONS.

Extirpation of the Superior Maxilla.

The extensive destruction of the Jaws, both by injuries, as from musket and cannon balls in battle, as well as from necrosis and other diseases which have occasionally destroyed the entire superior maxillary bone, without any very bad consequences resulting to the individual, and unattended with much deformity, first suggested the feasibility and propriety of attempting the complete extirpation of the upper jaw-bone, and the partial and even total removal of the lower one.

The extirpation of the superior maxilla is stated to have been actually effected by Acoluthus so long ago as the year 1693.* But Dupuytren, and Lizars, dispute the palm of being the first to recommend the operation of complete extirpation of that bone. Gensoul

* "Cooper's Surgical Dictionary. Art. Bones, excision of."

first performed this operation on the 29th of May 1827; and Lizars first attempted to remove the entire superior maxilla the December following. This unfortunately, however, was but an attempt, as the operator had to desist, after making a few deep incisions, in consequence of the alarming hœmorrhagic disposition of the gum and palate, the patient having lost in a few seconds upwards of two pounds of blood, which, Mr. Lizars says in his description of the operation, "welled up at every incision as if there had been an aneurism by anastomosis," notwithstanding the first step taken was to secure the carotid artery. The unfortunate man, "who was a strong athletic miner or collier, survived this attempt seventeen months, lingering out a most loathsome existence, and suffering great agony for weeks prior to his decease. His face became frightfully distorted, the eyes separated from each other to a great distance, starting from their sockets, and being quite amaurotic; the cornea of the right eye had ruptured from the pressure, and the iris protruded; the nose got flattened or concealed:

the mouth was wide open; a sinuous ulcer appeared on the forehead; and the glands on each side of the neck, especially those of the right, were enlarged, indurated and ulcerated!"*

Although the honor of having been the first to *propose* the operation of cutting round the base of the tumor, so as to divide only healthy parts, may be justly due to Mr. Lizars; the merit of being before him in putting that admirable suggestion into practice, is clearly M. Gensoul's right. However, it is beyond all doubt, that Mr. Lizars was the first Surgeon who performed the operation in Great Britain; Liston, Syme, Earl, Guthrie, Fergusson and other English Surgeons have since performed it. In France, Gensoul, Dupuytren, and Robert, have been the principal operators; Mott has extirpated the upper jaw in America, and now it is an established operation, performed in all parts of the world, wherever surgery is studied as a science.

Between 1827 and 1836, this operation was performed fifteen times, and out of the fifteen

* Lancet, vol. ii. 1829-30.

there were eleven deaths. The remarkable want of success which attended the first operations on this bone, when contrasted with the almost invariably happy terminations of those which have been performed of late years, leads us naturally to enquire into the cause of so many failures. Mr. Liston says, "in two of the four who are said to have been cured, the tumor is admitted to have been soft, and probably of a bad kind. In fact, out of the fifteen, one case only appears to have been at the period when interfered with, very favourable for the operation." This at once explains the matter, as it shows plainly that the great majority of the cases operated upon, were of that fatal nature for which as yet we know no remedy, and which no surgeon would now have the "foolhardiness," as Mr. Liston expresses it, to attempt to cure by the knife, when once the surrounding parts became involved in the disease.

The methods of operating, there can be no doubt, were also in some instances, partly the cause of the sad results recorded. The dread of hœmorrhage was so great, it was

imagined that unless the carotid artery, or at least the trunk of the internal maxillary was secured, the bleeding would be apt to prove fatal. Accordingly, either one or other of these vessels was tied, (in itself a severe and dangerous operation) as a mere preliminary to the extirpation of the bone; and with what effect, Lizars' unfortunate case is a melancholy example. Even if the parts were in every respect favourably circumstanced for an operation, the tying of the carotid artery would be found but of little use, in consequence of the free anastomosis between the vessels of the diseased and healthy sides.

The instruments employed by some surgeons, particularly the French, were barbarous to a degree; sufficient to shake the nervous system to its centre, and thereby in a weakly person, to diminish those powers of life so necessary to recovery, after the shock of so severe an operation as this is, even when performed by the most skilful hands. I allude to the chisel, gouge, and mallet with which they used to punch out the bone, "every stroke of the mallet causing the most exquisite

pain to the patient."* Mr. Liston, speaking of these *tools*, says, "How such instruments could at this period be selected for the purpose, I cannot comprehend. If one were desirous of protracting an operation, and adding to the patient's sufferings, of jarring the bones of the face and head, and jumbling their contents, no more effectual means could by any possibility be contrived." And all this without one single advantage to be gained by their use; in fact there is no conceivable case in which I think it would be justifiable to employ such instruments. There is no modification of the operation which may not be performed with the saw and bone nippers, and therefore I am convinced, that no Surgeon would now use the chisel and mallet, to cut out the upper jaw with, unless he was in perfect ignorance of all that has been done in this branch of surgery, for the last ten or fifteen years, and that he only remembered the *workman-like* dexterity, with which the lecturers on operative surgery in Paris, used to chop the bones of the face to pieces,

* See M. Robert's case, Lancet, vol. i. 1831-5.

when teaching this operation, on the dead subject.

The only instruments which are now deemed necessary for this operation, are, a strong scalpel, a small knife-saw, a Hey's saw, a pair of strong Liston's bone-nippers, and a bent copper or silver spatula, for a retractor. Of course tenaculæ, forceps, curved needles for sewing-up the wounded cheek, and hare-lip pins, to bring the divided lip together, should be in readiness, before commencing the operation.

I know of no operation which requires on the part of the Surgeon, a more perfect knowledge of the region in which the disease is seated, which compells him to have fixed in his mind every step he is about to take, and to calculate every change of plan which an altered state of the parts, as they are exposed, may require him to make in the progress of the operation, than the excision of the superior maxilla. I would therefore recommend the young surgeon, before proceeding to this operation, to refresh his recollection of the anatomy of this region, *practically if possible.*

He should ponder well over the parts he is about to cut through; the thickness of the bones to be divided, and the depth of the incisions to be made, and then to lay down a plan for himself, according to the nature of the case, with a fixed determination not to deviate from it, so far as circumstances will admit of. I offer this advice from experience, as I know the value of it. Had I not taken all the precautions I here recommend on the first occasion I extirpated the upper jaw, I feel convinced I could hardly have completed it, from the variety of circumstances that occurred during the operation, which the directions and descriptions given in books did not prepare me for, and in fact which cannot be described. No surgeon should attempt this operation unless he had at least one assistant, on whose firmness and judgment he may safely rely.

Having made all the necessary arrangements for the operation, the patient is placed in a strong arm chair, with his head resting against the breast of an assistant, or on a crutch attached to the back of the chair. (see case v.)

A second assistant stands at the patient's side prepared to make pressure upon the carotid artery, should it be necessary to do so in the course of the operation. The operator then takes his place in front of the patient, and should the extent of the disease require the removal of the entire maxillary, and malar bones, he makes an incision commencing at the zygomatic arch and terminating in the angle of the mouth. This incision should be first drawn forwards over the zygoma, as far as the malar eminence, then downwards over the surface of the tumor to within half an inch of the angle of the mouth, and into the cavity of the mouth through the centre of the commissure of the lips, the knife being guided by the fore and middle finger of one hand placed for the purpose in the mouth. By dissecting this flap upwards the whole of the attachments of the tumor may be laid bare; by detaching the upper lip and ala of the nose, the nasal process and hard palate are exposed. The zygomatic process is to be freed from the temporal fascia superiorly, and from the masseter muscle inferiorly at the

point to be divided by the nippers. The orbital process is next exposed, by raising the conjunctiva of the eye with the inferior oblique muscle. All these incisions and dissections, except the last, should be made with rapidity, as there are no parts of any importance endangered before arriving at the orbit. The cheek is next dissected downwards and backwards for a little way, and then the hard attachments are severed with the bone nippers, in the following order :—The zygomatic arch is to be first cut through ; the malar bone is next to be separated from its connexion with the external angular process of the os frontis, by cutting backwards into the spheno-maxillary fissure, taking care to guide the blade of the forceps, with the fore finger, so as to save the eye from injury. The nasal process must now be cut through, by inserting one blade of the nippers into the nostril and the other into the angle of the orbit, from this, the floor of the orbit may be divided by cutting it across with a strong knife to the spheno-maxillary fissure. An incisor tooth, or two if necessary, is next to be extracted

and the palate process, as far back as its junction with the palate bone, cut through with the nippers, keeping close to the tumor, in order not to remove more healthy bone in this situation than is absolutely necessary. The whole of the hard attachments being now divided, the tumor is found to be moveable, and slight pressure is in general found sufficient to displace it; when the knife is again resumed, and the external pterygoid muscle posteriorly, the masseter muscle anteriorly, and the mucous membrane of the back of the mouth, and cheek, cut through, and the tumor removed.

No matter how large the tumor, and how great the consequent distention of the cheek may have been, I recommend most strongly that no portion of the skin of the face, if healthy, be cut away. It almost invariably contracts to very nearly, if not completely, its natural dimensions, and if any of it has been removed with the tumor, no matter how small that portion may be, the want of skin enough, is much more likely to be complained of, when the cure is completed, than of there being too much, if the whole has been left.

Generally speaking, there are very few arteries which require ligatures after the tumor is removed, but a slight oozing of blood continues for half an hour or so, which exposure to the air alone, is found sufficient to stop. As soon as the bleeding ceases, and after the lips and cheek have been brought into even apposition, by means of hare-lip pins, and the interrupted suture, the cavity should be filled up with a few dossils of soft lint. In bringing the edges of the wounded lip together, care should be taken to insert the first pin close to its red margin, and to twist the ligature upon it, so as to fix it in its position, before the introduction of the second pin, should another be deemed necessary. A common sewing needle, of the requisite strength, with a head of sealing wax, and a triangular point, which may be prepared by rubbing it on a hone, will be found to answer this purpose very well. The long ends of the needles can be nipped off without difficulty, with a cutting pliers.

A few strips of adhesive plaster should now be applied, a dossil of lint wetted with cold water laid over the wound, and a light bandage

put on, to support the parts, the patient placed in bed, and if faint, and complaining much of pain, a draught, containing a drachm of laudanum, with a little ammonia and camphor mixture, should be administered without delay.

In general there is no need to dress the wound, before the third or fourth day. The pins are to be taken away if loose, (not otherwise) by gently twisting them between the finger and thumb, without disturbing the ligatures, which should be permitted to remain till they fall off. If suppuration is established in the punctures, the sutures should be cut through with a scissors, and removed, and in their place fresh strips of plaster applied, so as to prevent as much as possible, any separation of the parts.

In cases in which the orbital plate, and malar process of the superior maxilla may be saved, the anterior wall of the antrum is to be cut through with a Hey's saw; occasionally even a strong scissors is sufficient; all the other processes of the bone, are to be divided in the usual way, with the bone nippers. By these means the floor of the orbit

which supports the eye, the cheek bone, and the nasal processes are left uninjured, and the entire disease removed without producing much deformity; particularly if care is taken not to wound the branches of the facial nerve, which may be avoided by cutting parallel to their course, and dividing the cheek in a straight line backwards from the angle of the mouth, with one incision, and with the second, commencing about half an inch below the internal canthus of the eye, and carrying it along the side of the nose, round its ala, to terminate in the mouth, through the centre of the upper lip, leaving a flap, which when dissected upwards, would lay bare the whole base of the tumor, and enable the surgeon to use the saw, and nippers, with all necessary freedom.

When the entire of the superior maxilla is involved, but at the same time, if the tumor has not displaced, or produced absorption of the malar bone, the latter need not be removed, but in that case the malar process of the maxilla, is to be cut through into the spheno-maxillary fissure; this is best effected by first making a deep groove in the process with a

Hey's saw, before applying the nippers to divide it.

Mr. Liston's directions for forming the flap, are, to make an incision over the external angular process of the frontal bone, to be carried downwards through the cheek, to the corner of the mouth. A second incision is made along and down the zygoma, falling into the other. Then the knife is pushed through the integuments, to the nasal process of the maxilla, the cartilage of the ala is detached from the bone, and the lip is cut through in the mesial line.*

With great deference to so high an authority on all points of operative surgery, and particularly with reference to this operation, I venture to differ with Mr. Liston as to the necessity of making three incisions through the integuments of the face, at least in the generality of cases, viz. one from the os frontis to the mouth, a second meeting this at right angles over the malar bone, and a third along the side of the nose and through the upper lip. I think the single incision described in page 48 will be

* Liston's Operative Surgery, p. 265.

found to answer all the purposes proposed. By it the zygoma can be exposed with ease, a little dissection upwards will lay bare the point of union between the frontal and malar bones, and with the cheek, the ala of the nose and upper lip may be raised, and the alveolar and nasal processes exposed to the fullest extent. Of course cases occasionally present themselves, requiring additional incisions, but I think when they can be avoided, (and I believe in the majority of cases they are not necessary,) it will be found of advantage not to make them.

Mr. Lizars and Mr. Fergusson recommend that the saw should be applied to all the bony processes before attempting to cut through them with the nippers; but this I think quite unnecessary, as with the latter instrument they may be divided with perfect ease, and smoothness, and certainly with far greater despatch, and less pain to the patient, than by using the saw, whose action, can with great difficulty, be confined to the hard parts, and in fact its use is only necessary in the case before pointed out, viz. to divide the malar process, when the malar bone may be saved.

When performing this operation on an adult, the sitting posture is preferred, as it allows the head to be thrown forwards when the blood is flowing into the throat, more readily than could be done in the recumbent position. This position, however, is not adapted to very young persons, who do not possess resolution enough to avoid struggling during the operation. They should be placed upon a table, on the side, with the healthy cheek supported upon a pillow; when so placed one or two strong assistants will be able to hold the patient down and prevent his making any resistance, which might interrupt the course of the operation.

Amputation of the lower Jaw Bone.

This operation was first performed by Dupuytren in the year 1812, but it does not appear to have been attempted in England for many years afterwards. Mott of New York, performed the operation in 1821, Dr. M'Clellan of Philadelphia removed the body of the lower jaw in 1832, and Mr. Cusack and Dr. Philip Crampton of Dublin were the first

surgeons in Great Britain who amputated this bone, which operation they repeated several times in the year 1824 and 1825. Mr. Liston and Mr. Syme followed their example in 1828, in Edinburgh: since which date it has frequently been performed, and the jaw amputated both in part and totality in England, France and America.

This operation must be modified according to the extent and situation of the disease to be removed. Supposing the front of the jaw to be the part requiring removal, Dupuytren proposes to make an incision through the centre of the lower lip down to the os hyoides, an assistant holding one of the lips between his finger and thumb, while the operator secures the other himself in the same way, so as to command the bleeding. The knife is then to be entered anterior to the facial artery, (the latter being pushed back over the masseter muscle) and a second incision made, extending across the front of the tumor as far as the facial artery of the opposite side. By this means four flaps are formed, which, when dissected, expose the tumor completely without

wounding the external maxillary artery on either side. The bone is next to be cut through, and then the tumor turned out, and detached from the soft parts, which adhere to its internal surface.

In cases where the disease does not affect the whole depth of the jaw, but leaves the lower parts of the bone free, the surgeon should endeavour to save the sound portion of bone if practicable, in order to preserve the roundness of the chin. The deformity produced by the operation under such circumstances would be very trifling. Mr. Fergusson, in his admirable work on "Practical Surgery," gives the following description of this operation as he performed it himself:—"The patient was seated in a firm chair, and an incision was made directly downwards from each angle of the mouth, as low as the base of the bone: the lip and soft parts between these wounds were then dissected towards the neck; next the posterior bicuspid tooth was extracted on each side, and a slight notch made with the saw; the same instrument was then applied in a horizontal direction midway between the

alveoli and the base, and a notch being made the cutting pliers completed the separation."

When the disease is situated on the side of the bone, it may be exposed, by making an incision through the lower lip, to the margin of the chin, and from its lower extremity, continued outwards over the angle of the jaw; the bone being exposed anteriorly, and one of the incisor teeth extracted, the scalpel is then introduced behind the bone, and shoved upwards into the mouth, keeping it close to the internal surface of the chin, so as to divide the soft parts before using the saw. This instrument is then applied, and a groove cut with it, at least one third through the thickness of the bone; when with the nippers the division is effected with perfect ease. The state of the bone external to the tumor is now examined, by dissecting up the flap and cutting through the insertion of the masseter muscle. The surgeon should satisfy himself well before he proceeds to divide the bone in this situation, that it is perfectly sound: as he will find, should he make a mistake, and divide diseased bone, the greatest difficulty

in disarticulating the condyle when once he removes the lever by which the jaw may be depressed, and the coronoid process brought within reach of the knife, as the temporal muscle draws it far up under the zygomatic arch, and offers powerful resistance to its descent, so that such an error may cause great delay, and apparent bungling in the operation.

When the extent of the disease affecting the bone necessitates its disarticulation from the glenoid cavity, and this step being decided upon before the operation is commenced, the surgeon should proceed to effect that object as soon as the nippers have divided the bone anteriorly. Dissect up the flap, after continuing the incision through the integuments above described, as far as the articulation; then cut away the attachment of the masseter muscle, and having depressed the jaw, introduce a straight sharp-pointed bistoury (with a narrow blade and strong back), behind the coronoid process, and divide the tendon of the temporal muscle close to the bone; now lay bare the ramus of the jaw, and guide the knife along its posterior edge with the fore finger, with which

the carotid artery may be protected ; on arriving at the posterior edge of the condyle depress the jaw, which, now that the temporal muscle is detached, can be freely done, and enter the joint from behind ; after the capsular ligament is opened, by drawing the ramus downwards the condyle can be separated from its socket, and the knife passed through the joint with ease.

The muscular attachments posteriorly are now severed with the scalpel, by passing it over the head of the dislocated bone to its inner surface. The edge of the blade should be kept close to the tumor, and directed towards it during this part of the operation, and care taken to avoid the important nerves and large arteries which lie close to the internal surface of the diseased mass in the neighbourhood of the angle of the jaw. It is difficult, sometimes impossible to avoid wounding the internal maxillary, and external carotid arteries in disarticulating the jaw for large tumors ; but, after all, it is of little consequence, as they do not lie at any great depth, and they may be secured with perfect ease, before much mis-

chievous bleeding takes place ; the facial artery should be secured as soon as divided. It generally bleeds very freely, and as the removal of the tumor takes several minutes, it is useless to risk any unnecessary loss of blood, by delaying to secure the artery till the operation is completed.

It is not always necessary to cut though the lip to expose these tumors, and when that can be avoided, I think a great object is gained, as more or less deformity, or at least disagreeable expression, is almost invariably produced by wounding the red margin of the lip. The line of incision should always be made, so as to secure as little disfigurement, after the wound is healed as possible, and by cutting along the lower edge of the base of the bone, this object is found to be most certainly secured.

When the state of the bone will admit of it, I think it should be divided as much external to the symphysis as possible, in order to preserve the anterior belly of the dygastric muscle, which acts like a guy, and counteracts the tendency of the opposite muscles to draw the

chin towards their own side, and it enables the remaining portion of the jaw to be moved up and down in a straight line.

When the tumor is removed, the edges of the wound should be brought together in the way directed after the operation for removal of the upper jaw, with the interrupted and twisted sutures, the cavity being filled with dossils of soft lint, and the parts supported with a few strips of adhesive plaster and a light bandage; a piece of wet lint is then laid over the wound, and the patient placed in bed.

Mr. Liston's directions for this operation I shall give in his own words:—"An incision is made from the condyloid process, down the posterior border of the ramus, and along the lower margin of the bone, and terminates above the point of the chin in the mesial line, at about an inch from the free edge of the lip. The flap so formed is dissected up, the membrane of the mouth divided on each side of the bone, and the tumor thus perfectly exposed. Another incision, about an inch and a half long, may then be carried in the course of the external carotid, and made to meet

the other opposite the angle of the bone. A tooth, say the external incisor of the affected side having been previously removed, a small saw is applied so as to cut the bone to the required depth near the symphysis, the cutting forceps are applied in the notch and the bone clipped through. The cut end is now laid hold of, the tumor depressed, and the attachment of the temporal muscle separated from the coronoid process. The masseter muscle has been detached along with the coverings of the tumor. The bone being thoroughly loosened, the articulation is opened from before, and by carrying the bistoury close to the bone, the pterygoid muscles and other attachments are also divided, and the operation completed."*

It occasionally occurs, that the extent of bone involved is so great, as to oblige the surgeon to remove the whole body of the lower jaw, with one or both rami. The great danger of this operation, proceeds from the sudden retroversion of the tongue, which takes place the instant the muscles of the chin are divid-

* Liston's Operative Surgery, p. 270.

ed. It is forced back into the fauces, and by pressing the epiglottis on the superior opening of the windpipe, causes the most distressing feeling of suffocation. A frightful case of this nature is given in the "Archives Generales," 1822. Professor Lallemand, of Montpelier, removed a considerable portion of the base of the lower jaw, and when the muscles of the tongue were cut through, the patient fell senseless on the floor; the assistants and spectators rushed horror stricken from the room. The wound was bleeding violently, and the greatest consternation and dismay prevailed. The Professor immediately applied the actual cautery at a white heat, to the surface of the wound, which succeeded in arresting the hæmorrhage; he then made an opening into the larynx, between the thyroid and cricoid cartilages, through which the air rushed into the trachea, and the patient revived immediately, and ultimately recovered perfectly. Professor Lallemand got great credit for the presence of mind shown by him on this trying occasion; but unless he had reason to believe the larynx got filled with clotted blood

I do not think he was justified in cutting into it, merely to admit air, as that might have been accomplished by passing a hook through the tongue, and drawing it forwards, so as to raise with it the epiglottis, which by pressing upon the rima-glottidis, was in all probability the cause of the great distress the patient suffered.

To avoid the possibility of all such accidents, it is recommended by most surgeons to pass a thick ligature through the tip of the tongue, to prevent its being drawn back into the fauces when the muscles are divided, but I do not deem this absolutely necessary, as a hook can be in readiness, with which the tongue may be transfixed, and drawn forwards in a moment, should it be necessary to do so. By dividing the muscles slowly, and one by one, although the distress at first may be great, generally speaking, the organ will soon be found to recover itself, and in the course of a few hours, the patient will regain considerable power over its motions.*

It is a wise precaution to have the actual

* For a description of this operation see case V.

cautery in readiness in the event of an accident occurring, simlar to that in Professor Lallemond's case, but it is so seldom found necessary to resort to it, that I have never seen it applied, and have never used it myself, or met with a case in which its application was called for.

Many surgeons recommend that the tooth, or teeth which require removal, to admit of the application of the saw, should be extracted either the day preceeding the operation, or immediately before its commencement, but I think the patient is less likely to feel the full extent of that painful proceeding, while smarting from other wounds, and therefore I prefer deferring it, till I am about to cut through the bone.

CASE I.

Extirpation of the Superior Maxilla.

Fibro-cartilaginous Tumor.

Woodey Morrol, æt. 21, a Hindu of the farmer caste, tall, thin and slightly emaciated, native of a village called Pangey in the district of Kasba, which is a day's march from Jessore, and about three days' journey from Cal-

cutta, presented himself at the Gurranhatta Dispensary on the 6th of November, 1837, under the following circumstances:—

He says that about a year ago a swelling formed in his left cheek, immediately above the 2nd grinder, about the size of a sparrow's egg, causing much pain and inconvenience. This gradually increased in size, and about four months from its commencement, it had attained the bulk of a large orange, when he sought relief from a native doctor, who told him it was an abscess, which he promised to cure as soon as he thought it soft enough to puncture, and accordingly, in three or four days, though the hardness of the tumor had not at all diminished, he commenced his treatment by thrusting a needle into it, but no matter flowed from the wound thus formed; the doctor then set to work to bring it to a head, and for a few days more, frequently rubbed it with some mysterious compound, which he appeared to prepare with great skill and care; but this disappointing his expectations also, he gave it up, and absconded. The puncture made into the swelling with the needle produced no

ulcer or fungus, though the operation caused great pain and suffering to the patient.

From the time the doctor ceased his treatment the tumor went on increasing ; it gradually protruded into the mouth, and six months after its first appearance, it commenced bleeding copiously once or twice a month, and he says the bleeding was more abundant, and more certain to return at the full of the moon, than at any other time during the month. This periodical discharge of blood did not produce any salutary alteration, or effect any check on the advancement of this frightful disease ; it still continued to increase in pain and bulk, until, after filling the mouth so as nearly to produce suffocation, it at last protruded from that cavity through the lips, and went on, rapidly growing up to the day of his admission into the dispensary.

He positively says that he never received an injury of any kind in that cheek or jaw, and that he never had a tooth drawn or an unsound one. On his admission into the Dispensary, the tumor presented the following appearance : —

An enormous growth completely occupied the left side of the face, rising to a level with the floor of the orbit, and extending a long way below the inferior maxilla, but unattached to it; occupying the whole of the anterior and left side of the mouth, and protruding between the lips, pressing down the lower jaw, so as almost to make the chin touch the throat, and flattening the nose so as to leave but little trace of the natural prominence of that organ. Still there was no difficulty of swallowing, and the patient seemed to breathe without inconvenience through the right nares. That portion of the tumor which protruded through the mouth, was of a bright red color, and covered with mucous membrane, having at its upper part the canine, and the two incisors of its own side, with the central incisor of the opposite maxilla sticking out of it. The dimensions of this mass were as follows: from the part near the ear to the most prominent point which protruded from the mouth, exactly 12 inches, and from that part which bulged below the inferior maxilla to the edge of the orbit about 10 inches. It looked, as near as may

be, equal in size to the patient's head. The skin over the tumor was perfectly sound and not adhering to it, and many of the muscles of that cheek still retained their healthy actions; there was not the slightest trace of ulceration on any part of the tumor, and the principal source of pain to the patient appeared to be, from distention and pressure on the surrounding parts.

He always hung a cloth upon the tumor, the end of which he kept constantly applied to his mouth for the purpose of collecting the saliva, which was secreted in great abundance, and also to concentrate the sound of the voice when speaking.

Taking every thing into consideration, the youth of the patient, and his general good health, and also the benign character of the tumor, and its freedom from any attachment to the lower jaw, I felt not only warranted but in duty bound to offer this poor sufferer the only chance now left for him of escaping a lingering and frightful death, which of course was only to be hoped for by his submitting to an operation; and he not only willingly, but

joyfully acceded to the proposal. For the few days he remained in the Dispensary before the operation, while I was waiting to have the accompanying drawings executed, he frequently urged that no further delay might be made, as he said he felt the tumor growing larger, and becoming more painful daily. So pressing were his entreaties to have it removed that I refrained from having a cast of it taken, as that would have caused the delay of an additional day, though I was very anxious to procure one for the museum of the Medical College.

On the 9th, three days after the patient was admitted into the Dispensary, I had him taken to the threatre of the Medical College, where, for the advantage of the pupils, and also as having there better light and room than in any apartment in my Dispensary, I thought it best to operate.

The patient being seated in a stout arm chair, and his head supported by Dr. Corbyn, who kindly offered to undertake that charge. while a second assistant, Dr. Goodeve, stood at his left side prepared to make pressure on

the carotid artery, if at any time during the operation the bleeding called for such interference. I commenced the operation by making a cut through the skin over the upper part of the tumor, commencing at the posterior edge of the left malar bone and terminating in the upper lip, which I divided about an inch from the ala of the nose. I then cut from its bony attachments, the cartilage of the nose, turned up the left ala, and continued the dissection as far upwards as the edge of the orbit, and back to the zygomatic process of the malar bone, which I laid bare, and with a Liston's bone-nippers divided. I next carefully raised the periosteum of the floor, and external side of the orbit with the handle of the knife, and again took the bone nippers and cut through the malar bone into the spheno-maxillary fissure. I then cut through the orbital process of the superior maxilla with a strong knife, dividing the superior maxillary nerve at the same time; the nasal process of the superior maxilla was next cut, and then, after drawing the second incisor of the opposite side (for the extent of the disease required

it), I cut through the alveolar process, and hard palate, as far back as the palatal process of the palate bone, with the bone-nippers; and now all the strong attachments of the tumor being completely severed, I had no difficulty in removing that mass, carefully separating with the knife the palatal process of the superior maxilla, from the palatal plate of the palate bone, so as to preserve the soft palate from injury. The whole of the superior maxillary bone of the left side, part of the alveolar processes, and palate plate of the superior maxilla of the opposite side, and also the malar bone of the left side, were involved in the disease.

The tumor weighed four pounds, it was nearly globular in form, having at its inferior surface a deep groove into which the lower jaw sunk, and the teeth before mentioned projecting from its anterior and upper part. In making a section right through its axis it was found to be of a dense fibro-cartilaginous structure, surrounded for three-fourths of its entire extent by a pellicle of bone about the thickness of fine parchment, and where the

bone was deficient, by condensed cellular membrane. There was no trace of any one of the original processes of the bones involved in this diseased mass; they all appear to have been absorbed, and a case was formed for the tumor by the deposition of new bone.

During the whole time of the operation, which took near 10 minutes to complete, there was not the slightest need for interference with the carotid artery, or even to place a finger on a spouting vessel; and I should suppose, in all, the patient could not have lost more than from 8 to 9 oz. of blood, no ligatures were required, and a few minutes after the tumor was removed all bleeding ceased. Not a particle of the disease could have been left behind, as the tumor came out whole and unbroken, except a small piece which pressed so high up against the floor of the orbit, that I was obliged to cut it off when removing the great mass; but this was taken out immediately after, without even having to use the knife for its removal.

I need not attempt to describe the hideous

chasm that now remained, for no surgeon can have much difficulty in forming a correct notion of it, when he reflects on the parts removed and the size of the tumor that occupied it: I put a few dossils of lint into it, and brought the edges of the wound together, with five points of interrupted and three of the twisted sutures. As soon as this part of the operation was finished, the patient appeared to be slightly convulsed, and fainted; he was then laid on his back on the floor, but after a few seconds revived again, when he sat up himself and insisted on being allowed to swallow two or three tumblers of cold water; he was then placed in bed, and a dossil of wet lint laid over the wound. I had given him 80 drops of laudanum before the operation, but in about two hours after, as he complained loudly of pain, I gave him 1 gr. of the muriate of morphia, which set him to sleep after a short time.

9 P. M. Complaining of great pain, but in every respect is getting on satisfactorily; no oozing of blood from the wound, pulse 120, small, slight heat of skin, the wet lint to be kept constantly to the wound.

10th.—6 A. M. Passed a good night, slept several hours and did not complain so much when he awoke as before falling asleep, pulse 100, still very small; heat of skin slightly increased, wound looking well, slight swelling and inflammation of the cheek.

12 o'clock, twenty-four hours after the operation, complaining of great pain, but the lower part of wound united by the first intention; to take immediately 1 gr. of morphia.

9 P. M. slept several hours after taking the morphia, and when he awoke felt so much relieved as to insist on being permitted to *smoke the huqqua,* which the attendants say he managed very well with the sound side of his mouth ; had two healthy stools in the course of the day; heat of skin not so much as it was in the morning ; to get 1 gr. of morphia at 11 o'clock to-night.

11th.—6 A. M. Passed a good night, slept soundly for several hours, wound looking well and nearly all united, swelling of face increased, heat of skin higher than yesterday and he complained of pains all over his body : misturæ sennæ 1 oz. to be taken immediately.

8. P. M. The medicine operated on his bowels three or four times, and he has since been much relieved; has now no fever, and only complains of the soreness of his mouth; ate some sago in the course of the afternoon, and found no difficulty in swallowing.

12th.—Three days after the operation, wound of face quite healed except in one small point below the external angle of the eye; removed all the pins and sutures, and dressed the part with strips of isinglass. The upper extremity of wound looks much inflamed and as if likely to slough. There is much œdema and swelling of the lip, both above and below the part divided; flow of saliva from the mouth most profuse, so much so as to oblige him to keep his head constantly over a vessel to receive it: ordered some infusion of oak bark as a wash for the mouth. I should have mentioned that the mouth remained as wide apart after the operation as before the tumor that distended it was removed; he appeared to have lost the power over the muscles that raise the lower jaw, but it is gradually closing, and I dare say, in a day or two more he will be able to shut it completely.

13th.—Slept well last night, no fever, and now makes but few complaints: the flowing from the mouth still very profuse.

14th.—No change, except that he can now shut his mouth.

15th.—The plaister got loose, and about an inch and a half of upper part of wound which was united has separated; a small slough has also come away from its upper corner, but the wound inside is filling up rapidly with healthy granulations. Patient's general health improving, pulse strong and regular and he eats with a good appetite; brought the edges of the wound together again with some strips of common adhesive plaister, which I now think preferable for such wounds in this country; œdema of lower part of face diminishing, and the flowing from the mouth not so profuse; skin contracting very much, and thickening.

20th.—Has been getting on very well, œdema of lower lip much reduced, and the mouth is now nearly as small as it ever could have been. He has perfect action over the orbicularis oris at the wounded as well as the sound side of mouth; the upper part of wound con-

tracting slowly but not yet united, he is looking stouter than he was before the operation.

I may observe, before concluding this communication, that I consider this case as characterized by every mark which distinguishes the benign from the malignant form of tumors of the upper jaw. The skin was sound and unadhering to the tumor, the tumor itself was firm and not painful to the touch, the patient's constitution was unimpaired, and the expression of his countenance was healthy; while on the other hand all the signs of malignancy were absent, there was no trace of unhealthy ulceration, or of the soft and bleeding fungi making their way through the integuments, no fetid discharge tinged with blood; nor were there any purple tubercles adhering to the subjacent tumor to be seen upon the skin, as occurs in cases of an unhealthy character.

CASE II.

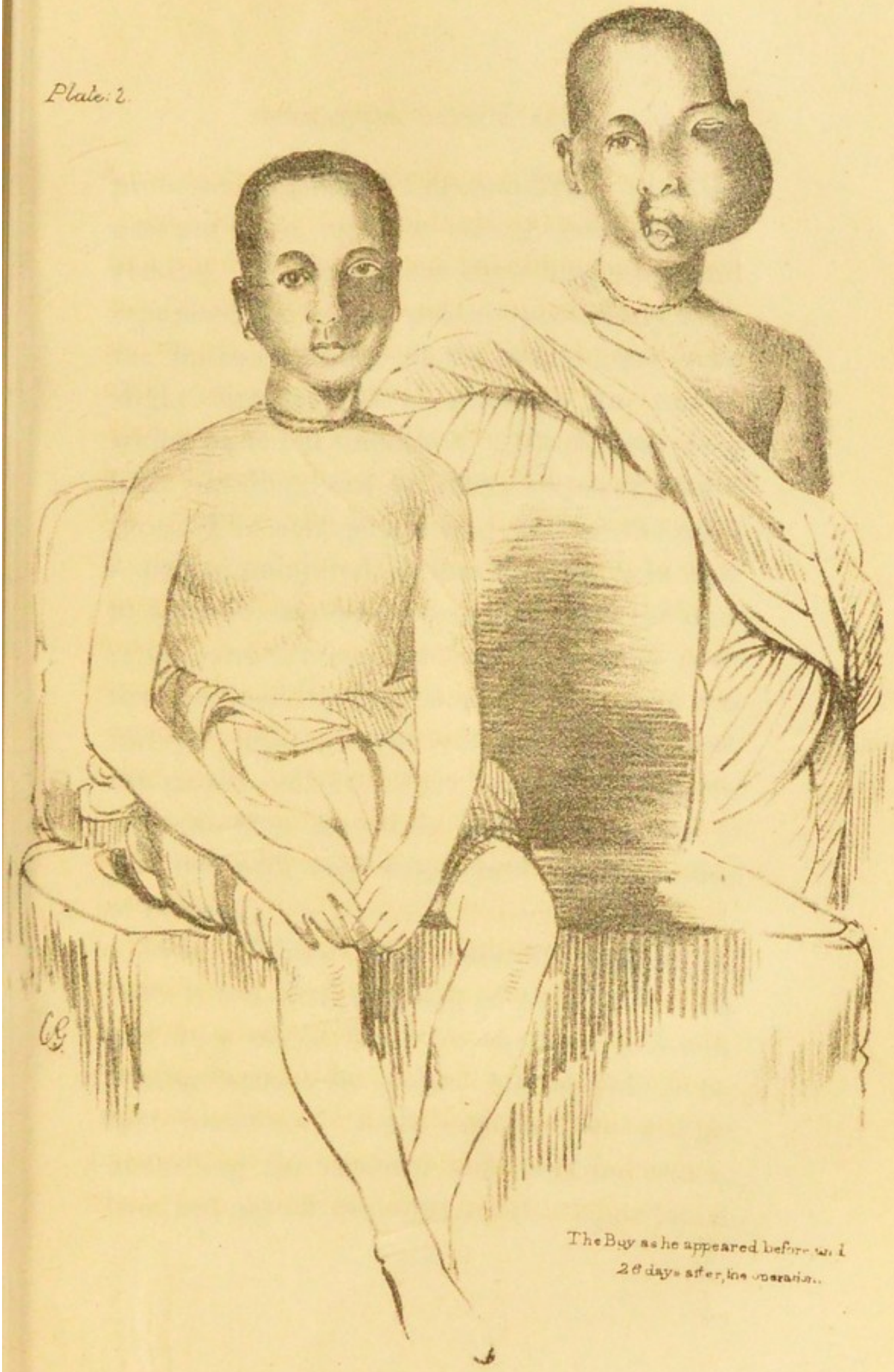
The subject of this case is a Hindoo boy, 11 years of age, of a healthy appearance, though slight in stature. He says that he always en-

joyed excellent health, until nine or ten months ago, when he got an attack of fever, after which he for the first time, observed a swelling over the left gums. It was hard, but not painful, and at first gave him but very trifling inconvenience. Every month from this time he had one or two attacks of fever, and he says, during each paroxysm, the tumor appeared to get larger, and it felt hotter and heavier then, than at any other time. It went on increasing rapidly, and when he presented himself at my Dispensary, on the 7th of last month, had attained the size of a cricket ball. It occupied the whole of the left side of the face, extending upwards, so as to encroach on the orbit, inwards as far as the mesial line, and backwards nearly as far as the palate-plate of the palate-bone. The eye of that side was closed, the cheek and mouth considerably stretched, and the nose completely flattened; a small portion of the tumor protruded between the lips, where the two incisor and canine teeth projected irregularly out of it. On opening the lids of the closed eye, the ball was observed to be raised in its socket, and

when the patient looked at any object with both eyes, he saw double, showing that the left eye was compressed between the tumor and roof of the orbit. The skin of the cheek was smooth and healthy, and the tumor under it felt even, compact, and slightly elastic. The teeth in this growth were all perfectly sound. He never had one drawn or diseased, and he never received an injury of any kind on that side of the face.

On the 12th June, I performed the operation in the following manner:—The boy being placed on a table, on his right side, I commenced by making an incision from the zygomatic arch, over the malar bone, then down the cheek, and through the commissure of the lips into the mouth. The cheek was easily separated from the tumor, which, I turned up with the ala of the nose, so as to expose the whole of the diseased parts. I next divided the zygomatic arch, the malar bone into the spheno-maxillary fissure, and the nasal process of the superior maxilla. I now with a forceps, extracted the middle incisor of the diseased side, and cut through the alveolar, and palate

Plate: 2.



The Boy as he appeared before and
28 days after the operation.

processes, all which I accomplished with the greatest ease, with a strong bone-nippers. Having, with a knife, cut the orbital plate, and separated the palate process posteriorly from the horizontal plate of the palate-bone, very slight force served to dislodge the tumor, which came out unbroken. There was very little bleeding, and no artery required a ligature. The soft palate and floor of the orbit remained uninjured, so that the boy was able to swallow, almost immediately after the operation, and the eye resumed its natural position, and healthy functions. The wound was brought together with one hare-lip pin near the mouth, and five or six interrupted sutures. He was then placed in bed, and a dossil of lint, wet with cold water, laid along the line of incision.

15th. Three days after the operation; there is but little swelling of the cheek. He had very slight fever for the first four-and-twenty hours; the wound has united by the first intention. Took out the pin without disturbing the threads, and removed one or two, but not all the sutures,—for those I took

away, I substituted slips of sticking plaster to support the cheek.

On the 10th day all dressings were removed, and the wound was found perfectly united. There was then a discharge of pus from the mouth, and the cavity was rapidly filling up with healthy granulations. The cheek has of course fallen in, but I think, in a short time, it will differ very little from the other. The boy is now, (four weeks after the operation,) in perfect health, and he eats and drinks with ease and comfort. For some time after the tumor was removed, the nose was drawn towards the healthy side, and there was partial loss of sensation of the wounded cheek, but the nose is now nearly quite straight, and sensation has returned.

The tumor consists of fibro-cartilage, surrounded by a thin case of bone; it is nearly spherical in form, and studded irregularly at its lower part with teeth. I found two or three teeth which had not yet presented externally, embedded in the mass, surrounded by their capsules, and evidently progressing to maturity in as healthy a state as if the parts around

them were perfectly sound; a strong proof I think of the benign nature of the growth.

CASE III.

Before the subject of the last case was dismissed from the Dispensary, a young Hindoo woman presented herself, with a tumor of the jaw, precisely similar to the one I had just removed, but smaller, it not being larger than a hand-ball. On examination, I found it had not yet protruded into the mouth, or displaced any of the alveolar processes or teeth at that side, and that all the latter were perfectly sound. She was very anxious to have it removed, and had come to me for that purpose some months before, but I refused then to perform the operation, as I did not think myself justified in removing the whole of the superior maxilla, for a disease which produced only slight deformity, and little or no pain or inconvenience. I accordingly sent her away, and told her to return, when it grew larger. On her re-appearance at the Dispensary, I

perceived the tumor had not increased a great deal, and the orbit, palate and teeth were still undisturbed. It now occurred to me that if I could remove the tumor from the antrum, without interfering with the palate, or alveolar processes, I might save her from the necessity of undergoing, at a future period, the far more formidable operation of excision of the superior maxilla. I accordingly determined on removing merely the anterior wall of the antrum, and with it the fibro-cartilaginous growth. This I accomplished in the following manner:—I made an incision from the angle of the mouth, upwards and backwards, over the tumor, about two inches in length; this enabled me to lay bare the bone, and then I had little difficulty in cutting through it, round the base of the tumor, with a strong scissors. I next sliced it off with a scalpel, and when the whole was removed, I scraped the internal lining of the antrum, to which the substance strongly adhered. The wound was dressed in the ordinary way, and in less than a month she left the Dispensary quite well.

There was of course no falling in of the cheek, and consequently very little deformity. I have frequently seen her since, and there appears not to be the least disposition to a return of the disease. She has perfect use of that side of her mouth, and can masticate her food equally well at both sides.

Since this case was published in the Transactions of the Medical and Physical Society of Calcutta, I have seen the person on whom the operation was performed several times, and I never could perceive the slightest disposition to a return of the disease. She was very little deformed, and as I saved the orbital plate and alveolar arch of the maxilla, there was no drooping of the eye, and she retained perfect use of her upper as well as lower jaw, her teeth in both being complete in number, and perfectly sound.

It was my intention to publish a drawing of the appearance of the young woman in this little work, in order to show how successfully such an operation might be performed on a favourable subject, but on sending for her a few

days ago I was sorry to learn that she had died of cholera but three days before.

November, 1844.

CASE IV.

Spina Ventosa.

Amputation of half the Lower Jaw.

Kistomohun Paul, ætat 24, a remarkably healthy-looking young man, presented himself at the Garranhatta Dispensary on the 21st of April last, requesting to be relieved from a tumor situated in the lower jaw. He says that it commenced about four years ago, with gum-boil near the second molar tooth at the right side, which suppurated and continued for some time to discharge a quantity of pus. The tooth soon became loose and was extracted ; his jaw then began to swell and in a year, or a year and a half, it gradually increased to near its present size, but it was not severely painful, or productive of very serious inconvenience during its growth : he says that for the last two years he has not observed any alteration in it in point of size, but in consequence of the deformity it produces he expressed him-

Plate 3.

self willing to undergo any operation that may be deemed necessary for its removal. On admission into Hospital, the tumor presented the following appearance: It was about the size of two closed hands, nearly spherical in form; extending as high up as the zygomatic arch, and downwards, to about two inches below the base of the jaw; posteriorly, it reached the mastoid process, and anteriorly, extended as far as the external incisor tooth. Within the mouth, it forced the tongue upwards and to the opposite side, and by its pressure on the alveolar processes of the superior maxilla of its own side the teeth were considerably displaced, and the gums had a spongy appearance as if about to become affected with the same disease: the skin covering the tumor was perfectly healthy and moveable. The surface of the tumor appeared of uniform density and perfectly smooth, but as the finger was passed over it, in two or three places it sunk into a pit, which was evidently covered by a membrane and surrounded by a sharp edge of bone: pressure on any part of the tumor produced no pain. The

man had tolerable up and down motion of the jaw, but no power of moving it laterally.

I performed the operation on the 25th of April, by first extracting the external incisor of the diseased side, and then making an incision through the lower lip a little to the right of the mesial line; this incision I continued through the chin and for two or three lines below it, and next carried an incision at a right angle from the lowest part of it about two inches outwards and to the right side. I was then able to separate the flap so formed, and having bared the bone, I commenced to cut through it with the saw, finishing its division with Liston's forceps. I then continued the last incision through the skin along the base of the jaw, round its angle, and up as far as opposite the tube of the ear; this flap was reflected upwards, and the whole surface of the tumor exposed.

My next object was to separate the insertion of the temporal muscle from the coronoid process, but this I had the greatest difficulty in accomplishing, from the manner in which

that process was wedged in, under the zygomatic arch, there was no room either from before or behind to introduce the blade of the knife for that purpose, so that it was not until I had separated the tumor from the tongue and mucous membrane, and also loosened the articulation by dividing the ligaments, that I was able to free it from this strong attachment; but that being accomplished there was no further obstacle to the removal of the diseased mass. While dissecting the tumor from the back part of the mouth I felt I was in considerable danger, as I could distinctly feel the internal carotid artery beating strongly, close to it, and that if I cut incautiously, in all probability I should divide that vessel. There was but little blood lost during the operation, though it was necessary to tie five or six arteries afterwards. In about two hours after the operation I closed the wound, with two points of twisted and four interrupted sutures, put a piece of wet lint on the part, and left orders that it should be kept moist. On the third day I took out the pins, the wound through the lips being healed; in six days

after the operation the greater part of the wound was strongly united, but a small portion, about half an inch near the angle of the jaw, remained open for a considerable time, through which the saliva flowed: before his discharge from hospital however it had completely closed up. He had not a single disagreeable symptom or the slightest fever after the operation, though it may not be uninteresting to mention, that the temperature at the time of the operation in the hospital was 96°, and was not, up to the date of his discharge, (3rd of June,) lower than 90° during the day.

The tumor after maceration was found to be a hollow shell of bone, containing in its centre a quantity of a gelatinous and fluid substance, and a few particles of bone, like pieces of honeycomb. The coronoid process was hollowed out, like the rest of the bone, and so thick that it must have completely filled the lower part of the temporal fossa, which accounts for the difficulty I experienced when trying to divide the temporal muscle: the natural appearance of the neck of the jawbone

was also lost, and the condyle only to be distinguished by the cartilage which covered it.

The poor man left the hospital quite delighted with his improved appearance ; indeed at a little distance no one would ever suppose that any portion of his jaw had been removed.

CASE V.

Osteosarcoma.

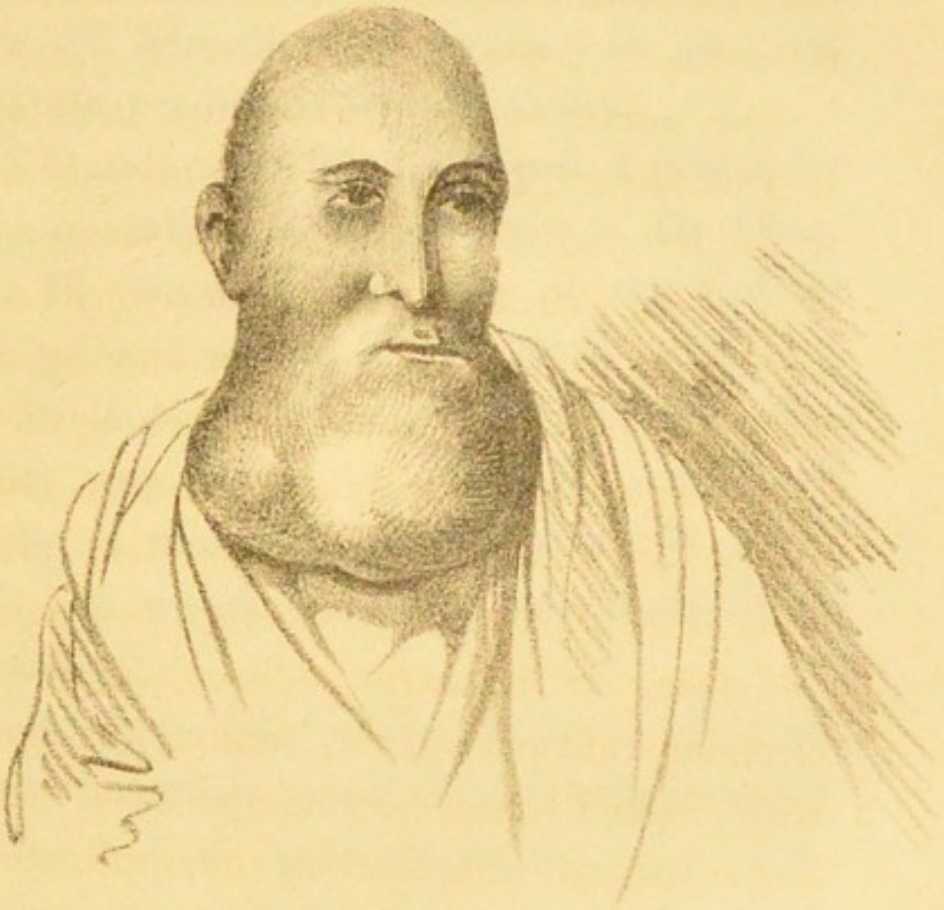
Amputation of the entire body and right ramus of the Lower Jaw.

The subject of the following case is a Native of Tirhoot, about forty years of age, and of a strong, healthy constitution. He presented himself at the Gurranhuttah Dispensary in April last, with a tumor of the inferior maxillary bone, which he stated had been growing for about two years and a half. The disease first appeared in the form of a small painful swelling of the gum, at the root of the right anterior molar tooth, which soon fell out. This swelling gradually increased; and as the disease advanced the teeth loosened, and dropped out, one by one, so that when

he presented himself at the dispensary, only the three last molars of the left side were remaining ; the disease having advanced to the root of the external molar tooth, which fell out a short time previous to his arrival in Calcutta.

The tumor engaged the entire body of the bone extending from the root of the right ramus to the left angle. It appeared to be about the size of an infant's head, and it projected forwards and downwards ; not producing much deformity to the mouth, but stretching the skin of the throat by its protrusion, so as to give the idea of great and painful distention. Externally it felt firm and elastic ; and slightly nodulated at the right side, where the skin covering that part of the tumor was marked with (indeed I may say composed of) numerous cicatrices, produced by the application of the actual cautery, caustics, and incisions employed by native quacks, in their rude attempts to cure the diseases. The tumor was not painful to the touch, except at the left side, where the remaining sound portion of bone joined the diseased mass.

Plate IV.



In the mouth the tumor projected so as to displace the tongue and force it upwards, backwards and towards the left side. The patient complained of constant pain, which he said prevented his sleeping at night, and he expressed himself most anxious to have the operation performed without delay.

On Monday, the 22nd of April, I proceeded to the operation in the presence of Dr. Chapman, Dr. Stewart, Mr. Daly of the College Hospital, and several of the Native and Ceylon Students of the Medical College. The patient was seated in a strong arm chair, having a moveable crutch attached to its back, on which his head was fixed by an assistant.

Standing in front of the patient, I commenced the operation, by an incision which extended from a little anterior to the lobe of the left ear, to opposite the tube of the right, cutting first downwards to the left angle, across the base of the tumor to the right angle, and then upwards as far as the articulation. This was the only incision I made through the skin. By turning up this flap,

and cutting through the membrane of the mouth, I was able to lay bare the entire extent of the disease, and to sever the bones without cutting through the lip at all ; thereby avoiding the chance of producing that disagreeable expression which I think is invariably given to the mouth by the cicatrix, when the lip has been divided, no matter how neatly the parts may be brought into apposition, or how evenly they may unite.

I cut through the bone, about an inch anterior to its angle, in the usual way, by first deeply notching it with a saw, and then applying the bone nippers. This being effected, I next proceeded to disarticulate the right condyle from its socket, which (having previously cut away the insertion of the temporal muscle) I found no difficulty in accomplishing, with a sharp-pointed, strong-backed knife.

The head of the bone being disarticulated, and the part of the jaw to be divided cut through, the rest of the operation was easily completed. In dividing the soft parts, I directed the edge of the knife towards the tumor, and made the incisions as close to it as

possible, the diseased mass being raised and drawn forwards at the same time with the left hand, so as to remove it, as far as practicable from the large vessels of the neck, with which it was in contact on either side of the larynx.

On dividing the muscles of the tongue, which I did slowly, one by one, there was, as I expected, a sudden retroversion of that organ into the fauces, causing much distress and struggling. This lasted, however, but for a few seconds, when the patient began to regain some power over it, and he was able to swallow fluids conveyed to the back of the tongue by means of a gum elastic tube; so that I had not much reason to regret having omitted the precaution recommended, and practised by most Surgeons, of passing a hook, or needle and thread through the tip of the tongue, by which it might be drawn forwards, (or prevented from going backwards,) on the division of the muscles being accomplished. This is a painful proceeding, and a cruel one, if not absolutely necessary.

During the operation I divided several large

arteries, which I secured as I proceeded; so that, with the exception of the internal maxillary, there was no vessel of any importance to take up after the tumor was removed. When the operation was completed the patient became slightly convulsed, cold, and almost pulseless. From this state of collapse he slowly recovered, and in the course of three or four hours a healthy re-action set in.

The convulsions returned slightly once or twice in the course of the day, and he complained of great pain in the throat on attempting to swallow. All these disagreeable symptoms disappeared in a day or two. He was fed on milk and mutton-broth, through a tube, having a glass funnel attached to one end, the other end being held by the patient himself on the dorsum of the tongue.

Nearly the whole of the skin which covered the right side of the tumor, and which was completely disorganised by the actual cautery, &c., sloughed away, leaving a large opening from the side of the throat into the cavity of the mouth; this has however gradually contracted and only a very small

fistula now remains, which may be easily remedied by a very simple operation, if it does not close of itself, as I expect it will in a few days.

The poor man is now comparatively in perfect comfort. He can eat and drink and sleep; and he is free from pain, a luxury to which he was a stranger for upwards of two years previous to the operation.

On examination of the tumor after the operation, I found it to possess the usual characteristics of Osteosarcoma. The centre cellular, containing a fluid of half brain, half grumous blood-like appearance, with spiculæ of bone projecting in all directions through it, the whole being surrounded by a thick coat of a fibro-cartilaginous character.

The accompanying admirable sketch of the appearance of the patient before the operation, is from the pencil of Mr. Daly of the Medical College.

July 1*st*, 1844.

It is upwards of seven months since the operation was performed, and the man is

now in perfect health and spirits. For the first few months he could not articulate sounds so as to make himelf easily understood, which distressed him very much, but now he is getting perfect power over his lips and tongue, and as he is allowing his beard to grow long, it will soon be difficult to tell from his appearance, that he lost so important a portion of his face, as his entire lower jaw.

November 21*st,* 1844.

1841 April 20th.

Donald McKenzie Weaver, aged Seventeen. Had lost his nose by the ulceration called Lupus. The flap was lifted from the forehead, and the Columna to divide the Nostrils, taken as a slip from the middle of the upper lip. The Cure is complete at this date.

Thomas Leslie Saddler, aged Twentyfour. Presents a fair Specimen of squinting cured by the new operation. The second view of his face taken four months after the operation is intended to shew its permanency; no offering is seen of the eye, either to turn outwards or inwards.

Alexander Shiach aged Twelve. After having had a tooth extracted for what he supposed toothache, the Jaw became locked, by the formation of a hard tumour presenting the appearance shown in figure 2nd. On the removal of the portion of carious bone sketched beneath the figures, by an incision in the Gum, the swelling gradually subsided, the motions of the jaw and the power of mastication were soon perfectly recovered, and the face rasumed its natural look as in Fig: 1st.

Dr KEITH'S CASE OF RESTORATION OF LOST NOSE.

Appearance of Donald MacKenzie's face previous to operation.

Front view of face at this date, March 1st 1841.

J Henderson Lithog

Side view of the same.

Thomas Leslie. Cured August 17th 1840.

Appearance March 1st 1841.

Dr KEITH'S CASE OF CARIOUS JAW.

Appearance after the Cure.

Appearance before removal of the diseased portion of the Jaw.

Size and appearance of the