

**A short treatise on operative surgery : describing the principal operations as they are practiced in England and France, designed for the use of students in operating on the dead body / By Charles Averill.**

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MEDICAL SOCIETY OF  
A  
SHORT TREATISE  
ON  
OPERATIVE SURGERY,  
DESCRIBING THE  
PRINCIPAL OPERATIONS AS THEY ARE  
PRACTISED IN  
*England and France,*  
DESIGNED FOR THE USE OF STUDENTS IN OPERATING  
ON THE  
DEAD BODY.

---

BY CHARLES AVERILL, SURGEON, CHELTENHAM.  
Fellow of the Royal College of Surgeons, London.

---

“Elle” (Chirurgie Operative) “sera toujours la partie la plus efficace de l’art de guérir entre les mains des hommes qui la cultiveront avec l’application qu’elle mérite et avec les lumières qu’elle exige.”

MÉMOIRES DE L’ACADÉMIE ROYALE DE CHIRURGIE.

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1823.

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ROYAL SOCIETY OF  
SURGEONS

# OPERATIVE SURGERY.

DESCRIBING THE  
PRINCIPAL OPERATIONS AS THEY ARE  
PRACTISED IN  
ENGLAND AND FRANCE.

DESIGNED FOR THE USE OF STUDENTS IN OPERATIVE

## DEAD BODY.

BY CHARLES AVERILL, Surgeon, Cheltenham.  
Fellow of the Royal College of Surgeons, London.

"Elle" (Chirurgie Opérative) est un ouvrage important et utile  
pour le chirurgien et le médecin. Elle est écrite en français  
et est très bien écrite. Elle est très utile pour le chirurgien  
et le médecin. Elle est très bien écrite. Elle est très utile  
pour le chirurgien et le médecin. Elle est très bien écrite.  
Elle est très utile pour le chirurgien et le médecin. Elle est  
très bien écrite. Elle est très utile pour le chirurgien et le  
médecin. Elle est très bien écrite. Elle est très utile pour  
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J. Agg, Printer, Evesham.

TO  
SIR ASTLEY COOPER, BART.

FELLOW OF THE ROYAL SOCIETY,

AND

SURGEON TO THE KING,

&c. &c. &c.

THE FOLLOWING  
SHORT TREATISE ON OPERATIVE SURGERY  
IS,

With his Permission,

RESPECTFULLY DEDICATED;

BEING

A SMALL BUT SINCERE TESTIMONY OF ADMIRATION

FOR

SURGICAL ATTAINMENTS

OF THE HIGHEST ORDER,

FROM

HIS FORMER PUPIL

AND

STILL OBLIGED FRIEND AND SERVANT,

THE AUTHOR.

*Cheltenham,*

*May 1st, 1823.*



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# ERRATA.

Page 1, line 6, .....	leave out the word <i>mere</i>
2, ..... 1, .....	for <i>pincipally</i> read <i>principally</i>
21, ..... 1, .....	put a <i>semi-colon</i> after <i>deeper</i>
23, ..... 3, .....	put a <i>comma</i> after <i>Anel</i>
32, ..... 11, .....	put a <i>colon</i> after <i>situated</i>
34, .. 7, 20, .....	for <i>Sartorious</i> read <i>Sartorius</i>
66, ..... 21, .....	put a <i>comma</i> after <i>canula</i>
84, ..... 17, .....	for <i>latter</i> read <i>last</i>
100, ..... 4, .....	for <i>and</i> read <i>an</i>
100, ..... 18, .....	for <i>fungos</i> read <i>fungus</i>
104, ..... 10, ..	for <i>while</i> read <i>whole</i>
109, ..... 10, .....	for <i>amputation</i> read <i>amputations</i>

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## INTRODUCTION.

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THE most cursory description of the operations of Surgery, is more than sufficient to demonstrate, that the art of performing them, with a proper regard to the lives and necessities of patients, can neither be learned by a mere spectator, nor acquired by any prescribed rules, without actual and frequent practice.

The Surgeon is required to know the form, structure, situation, and uses, of every organ in the living body ; and he



acquires this knowledge principally by dissection of the dead : but, to overcome that disgust, and distraction, which invariably attend the study of Human Anatomy, to familiarize the mind with the different operations, and the best mode of performing them, is indeed, to him, when a student, a difficult and laborious task ; yet it has been acknowledged from antiquity, that he must dissect ; and it is expedient he should dissect, with all the guidance and assistance, which the experience and instruction of others can supply. The knowledge of anatomy, and the art of operating on the human body, are, however, distinct ; and depend upon the principles of different sciences. The latter is especially derived from Mechanics, as well as from Anatomy, and is regulated by the doctrines of Surgery, which at once inform

the practitioner what will be the state of his patient after any operation, and suggest to him, the means of rendering that state, as favourable as possible.

The ultimate benefits of any surgical operation, must, of necessity, depend greatly on the dexterity of the operator, and any failure from a deficiency in this respect, is not less disgraceful to him, than unfortunate for his patient. The importance therefore to the student, of actual practice on the dead body, cannot be too highly estimated.

If the Surgeons of France retain, in any respect, the superiority they were formerly acknowledged to possess over those of this country, it is as operators only ; which can alone be accounted for, by the attention paid in the French schools, to the practice of operating on the dead. This single



branch of the science seems to be less insisted on, than might be wished or expected, by most English students in the dissecting room. It is usually taught in London, as collateral to the courses of anatomical lectures, few of which are devoted to the subject; while the practical knowledge is chiefly obtained from cases furnished by the hospitals. These are the only public opportunities of acquiring a qualification so essential to the professional character, so important to society.

The Author is not aware that any concise work exists, the sole object of which, is to enable the student to practise surgical operations upon the dead subject, preparatory to performing them on the living; and he has, in common with several of his friends, frequently felt the want of some such guide to direct his studies. Descrip-

tions of approved methods of operating on the living body, are, indeed, to be found dispersed through various surgical works, but all of them are too voluminous, and too expensive, to be used in the dissecting room. By the publication of the following Treatise, this desideratum is attempted to be supplied. For its contents, the Author's chief responsibility is that of a faithful narrator ; the methods of operating here described, not resting upon his authority, as the best adapted for every possible case, but as the most approved, and such as are now generally pursued. Several of the operations are prefaced by historical remarks, which strikingly exemplify the improved state of Surgery ; and the whole is arranged in a manner consistent with the Author's wish of presenting the greatest number practicable upon one dead body :



this being always a desirable object, and now rendered too imperative, by the impediments so injuriously opposed to the supply of subjects.

Those operations, which every Surgeon ought to be able to perform dexterously, are here described, in conformity with the rules adopted in the hospitals of England and France; according to the methods taught by Mons. Lisfranc, Surgeon to the first Dispensary, and Professor of Operative Surgery at the Hospital of la Pitié in Paris; as the Author himself has been accustomed to perform them, some on living subjects, and all on the dead body, in the course of his private anatomical studies.

The operations which are requisite for the cure of Strangulated Hernia, for Hydrocele, for diseases of the eye, for contractions of the *Æsophagus*, Urethra, and Intes-

tinum Rectum, for Polypus in the nose, and some others, are omitted, as they cannot, in general, be practiced on the dead body : but since the confidence of the Surgeon in performing them, chiefly depends on his anatomical knowledge, the necessary qualification is now justly enforced, and ably explained by the Teachers of Anatomy in London.

trum, Rectum, for Polypus in the nose, and some others, are omitted, as they cannot in general be practised on the dead body: but since the confidence of the Surgeon in performing them, chiefly depends on his anatomical knowledge, the necessary qualification is now justly enforced, and ably explained by the Teachers of Anatomy in London, at present, according to the plan taught by M<sup>rs</sup>. Lisfranc, Surgeon to the first Dispensary, and Professor of Operative Surgery at the Hospital of St. Paul in Paris: as the Author himself has been accustomed to perform them, some on living subjects, and all on the dead body, in the course of his private anatomical studies.

The operations which are requisite for the cure of Strangulated Hernie, for Hydronephrosis, for diseases of the eye, for contractions of the Esophagus, Urethra, and Intes-



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A  
SHORT TREATISE  
ON  
**Operative Surgery.**

---

OF INCISIONS.

Though it may appear superfluous to lay down rules for performing the first and most simple of all surgical operations, yet, it is universally allowed, that, if strict attention be not paid by the learner to the principles of any science, little hope can be entertained of his ultimate success. It is not sufficient, however, that the student be able to perform these primary operations, by any fixed rules, unless he acquire also, that ease and facility, which so strikingly distinguish the dexterous from the clumsy operator. Hence, the necessity is manifest, of careful and minute atten-



tion to a proper method of holding the bistoury, or scalpel, while making the various incisions about to be described. Quickness, and flexibility of hand, are, indeed, generally obtained, by long and frequent practice; yet a proper method of holding an instrument, tends, in no small degree, to facilitate these desirable attainments: and, to shew that this point is not too trifling to be insisted on, the words of a distinguished Professor are here introduced. “When that which is simple is fully attained, that which is more complex will be easier understood, and better performed; and it will often be found, that the final success of that which is great, very much depends on the accurate execution of that which is little,”

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#### TO MAKE A STRAIGHT INCISION.

With the fingers and thumb of the left hand, put the integuments on the stretch, and in the right, take the scalpel or bistoury,

holding it between the thumb and middle finger, at that part where the blade and handle unite, resting the fore-finger on the back of the blade, and applying the ring and little fingers closely round the handle, the extremity of which will rest against the side of the metacarpal bone of the little finger. In this form, pass the instrument perpendicularly through the integuments, and when it has penetrated to the necessary depth, lower the handle gradually, till the blade be almost horizontal, continuing the cut from left to right. When near the point at which it is intended to terminate the incision, raise the handle, so as to bring the instrument perpendicular, in order that the incision may be of equal depth from one extremity to the other.

In making this incision, care should be taken not to introduce the instrument so deep, as to wound any important part, which may be situated beneath; particular attention should also be paid to the state of the



## 12 STRAIGHT AND CRUCIAL INCISION.

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integuments, which, if not kept tense, roll before the instrument, prolonging the operation, and causing unnecessary pain to the patient.

These precautions being attended to, nothing more will, in general, be required to make the first incisions in the operation for hernia, in cutting upon arteries, for the removal of small subcutaneous tumors, &c., &c.

---

### TO MAKE A CRUCIAL INCISION.

This is formed of two straight incisions, the first of which is made from left to right, as directed; the second consists of two cuts, each of which, (supposing a circle drawn round the first,) is made from the circumference to the centre, or middle of the first incision, and at right angles to it. By making the second incision in two opposite directions, the integuments are kept tense during the operation, and the cut is made with less pain to the patient, than if performed at once.

The second incision may also be made thus. The bistoury is to be held flat in the hand, with its cutting edge turned towards the operator's right; it is then to be pushed under the integuments, from the middle of the farther border of the first incision, till its point arrives at the spot where it is intended to commence the second. The cutting edge, being now turned towards the surface, is to be protruded through the integuments from the point to the heel, and half of the incision finished, by drawing the bistoury from heel to point. In the same manner the opposite half is to be made, the operator thrusting the bistoury beneath the integuments towards himself. This method is more tedious and painful than the former, which, if cautiously performed, is always preferable.

In dissecting back the flaps, as in the operation of Trephining, the bistoury is to be held like a writing pen, the point of the nearest angle is to be raised between the thumb



## 14 CRUCIAL AND ELLIPTICAL INCISIONS.

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and fore-finger of the left hand, and dissected back with the point of the bistoury; then the cutting edge of the knife is to be turned in a contrary direction, and the opposite angle dissected back; again the direction of the cutting edge is to be changed, and so on alternately, for either of the remaining angles.

### TO MAKE ELLIPTICAL INCISIONS.

These are frequently employed in Surgical operations, as in the removal of schirrous breasts, tumors of considerable size, and in all cases in which a portion of integument is to be taken away with the diseased part.

The Operator with his left hand draws the integuments towards him away from the line which the incision is to take; whilst an assistant keeps them tense by pulling them in an opposite direction. The inferior half of the ellipsis is to be first formed, the course and extent of which being fixed, the cut is to be made from left to right. The superior is then

to be finished in the same manner, taking care that it correspond at every point with its fellow. The part may now be dissected out, and the lips of the wound brought in contact, to ascertain whether they exactly coincide.

The parietes of the abdomen, and the gluteal region are the parts best adapted for practising these incisions, there being generally more fat between the integuments and muscles in those situations, than in any other parts of the body.

### TO PUNCTURE AN ABSCESS.

A collection of matter, when superficially seated, is generally evacuated by a puncture made with a lancet; but when the abscess is a considerable distance from the surface, a straight bladed bistoury is the best instrument for performing the operation, which should be done thus.

The bistoury is to be held nearly perpendicular, with its point downwards, grasping



the heel between the thumb and fore-finger of the right hand, the middle finger being placed on the side of the blade, at the same distance from its point, as the matter is supposed to be from the surface. The hand being supported by the ring and little fingers, the bistoury is to be passed through the integuments into the abscess: the situation of the middle finger thus, prevents the instrument from puncturing too deep.

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TO

**DILATE A SINUS ON A GROOVED  
DIRECTOR.**

The handle of the director is to be held between the index, the middle fingers, and the thumb of the right hand, and its point introduced into the sinuous opening: then the handle is to be taken in the same manner in the left hand, and a Phymosis knife, or a straight narrow bladed bistoury, is to be held in the right, with its cutting edge directed

upwards; and in this way passed along the groove, lowering the handle of the director as the knife is pushed forwards, till it reaches the extremity of the sinus; there it is to be forced upwards through the integuments, and the operation finished by cutting towards the left hand; withdrawing the director as the incision is terminated.

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### LIGATURES ON ARTERIES.

The art of applying ligatures on arteries with a proper degree of constriction, so as to ensure the certainty of their action on the tied vessel, is of the utmost importance in the practice of Surgical operations. It is requisite that the following cautions be observed in all cases. That the fingers of the left hand be applied parallel to the direction of the incision, so as not only to mark its course and extent, but also to keep the integuments tense. The ligatures should be round and compact; those composed of a single waxed



thread are generally strong enough for securing any artery. The eyed probe slightly curved, and the aneurismal needle, are the instruments best adapted for passing the ligature beneath the vessel, which should be separated from its lateral connections as little as possible, yet dissected clean at that part where it is about to be secured.\* The ligature should be applied horizontally, and drawn with an even force, so as to divide the internal and middle coats of the artery; taking care that no accompanying nerve or vein be included within it. As it is an extraneous body, it should be rendered as small as possible; one of its ends should therefore be removed, unless Mr. Lawrence's method be

---

\*An instrument has lately been invented by Mr. Weiss Surgical Instrument Maker, in the Strand, for the purpose of passing the ligature under the artery, when very deeply seated, without raising it from its natural situation. I have once seen it used by Mr. Travers at St. Thomas' Hospital, in tying the Subclavian artery above the clavicle.

preferred, of cutting off both extremities close to the knot. If the patient faint during the operation, the wound should not be closed till he recover, in order to see if hæmorrhage takes place from any other vessel.

—  
TO  
**TIE THE RADIAL ARTERY AT THE WRIST.**

Feel for the styloid process of the radius, at which point begin your incision; continue it through the integuments for two inches, in the direction of a line which if continued would pass between the condyles of the os humeri; the artery will be found superficially situated, having the tendon of the supinator radii longus muscle on its outer side.

—  
**ULNAR ARTERY AT THE WRIST.**

Feel for the Pisiform bone, half an inch above which, and on the outer side of the flexor carpi ulnaris muscle, make a straight



## 20 ULNAR ARTERY IN THE FOREARM.

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incision of two inches in extent through the integuments; cut through the fascia, an assistant drawing the internal edge of the wound to the inner side; dissect carefully by the side of the tendon, and you find the artery situated on the outer side of the nerve. The colour of these smaller arteries remote from the heart, may occasionally lead the student to mistake them for veins, as the blood frequently remains in them after death, especially in old subjects.

## ULNAR ARTERY IN THE MIDDLE OF THE FOREARM.

About three fingers breadth from the internal condyle of the os humeri, on the anterior surface of the ulna, but near its inner edge, begin the incision; continue it in the direction of that bone for three inches; divide the fascia to the same extent, separate the presenting muscles, which are, on the outer side, the palmaris longus lying more superficial,

and the flexor sublimis deeper, and on the inner, the flexor carpi ulnaris. The nerve will be found situated deeply in the interspace, on the outer side of which the artery is placed.

### RADIAL ARTERY NEAR THE ELBOW JOINT.

In the axis of the angle formed by the two condyles of the os humeri, and the extensors and flexors of the hand, an incision is to be made through the integuments, commencing a little below the joint, and continued downwards for three inches. This exposes the fascia of the forearm, which is to be divided to the same extent; when the artery will be laid bare.

In wounds of these small arteries, which have free anastomosing branches, two ligatures are required to suppress the hæmorrhage; one above, the other below the wounded part; these are most readily applied by



enlarging the incision, and thus exposing the bleeding vessel. But if the artery be completely divided, its cut extremities retract to a considerable distance, the blood continues to flow into the neighbouring cellular membrane, and it becomes extremely difficult to find the bleeding orifice. In such a case, it is better first to cut down on the vessel at one of the before mentioned points, between the wound and the heart, and apply the first ligature; the lower bleeding extremity will then be more readily discovered.

---

### BRACHIAL ARTERY NEAR THE ELBOW.

This artery is occasionally punctured in the operation of venesection; producing an aneurism at the bend of the arm, which requires for its cure the obliteration of the vessel. Philagrius is said to be the first who tied this artery for an aneurismal swelling; he secured it above and below the tumor,

which he extirpated, and filled the wound with such dressings as tended to promote suppuration. Dominique Anel a French military surgeon, first tied the artery without opening the sac. The operation may be performed as follows.

Begin the incision half an inch above the inner condyle of the os humeri; continue it upwards along the inner edge of the biceps muscle for at least two inches; when, having cut through the integuments, and generally, a little fat, you find the median nerve rising before the artery, which has an accompanying vein on each side. Pass the ligature beneath the vessel from its inner side, by which means the nerve is readily excluded

#### BRACHIAL ARTERY IN THE MIDDLE OF THE ARM.

Make an incision through the integuments two inches long on the inner edge of the biceps muscle; this first exposes the median



nerve, which has the artery on its inner side between its two accompanying veins; the internal cutaneous nerve is situated on the inner side of the artery, diverging from it, as it descends in the arm.

The operator may be occasionally confused by this artery dividing unusually high in the arm; in the last extremity that I dissected, the separation took place in the axilla; the two trunks ran down the arm parallel to each other, till they reached the tendon of the biceps, where they diverged into radial and ulnar.

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### AXILLARY ARTERY.

A wound or aneurismal tumor of the upper part of the brachial artery would require the application of a ligature on the axillary, which may be applied as follows.

The part being shaved, or the hairs cut closely off with a pair of scissars, place the patient on his side, and let the arm be raised

up by an assistant; then feel in the axilla for the head of the bone, which is thus lowered by the position of the arm; over it make an incision, in the direction of the limb, three inches long, the middle part of which should be exactly over the head of the bone; this will expose a part of the axillary plexus, behind the largest nerve of which, the median, the artery will be found: the vein passes rather below the artery at this part. After the first incision through the integuments, use the blade of the knife as little as possible, to avoid wounding any of the branches of the vessel.

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### SUBCLAVIAN ARTERY BELOW THE CLAVICLE.

This artery has been successfully tied by the late Mr. Keate, Surgeon general to the army, and by Mr. Chamberlaine of Kingston, Jamaica, both in cases of axillary aneurism.

The following, on the dead subject, I have found the most ready method of securing this



vessel. Put the pectoral muscle on the stretch by raising the arm and extending it backwards; then observe the depression formed by the junction of its clavicular with its sternal portion, the direction of which must be the course of the incision. Begin it half an inch from the sternal extremity of the clavicle, and continue it through the integuments for three inches in the above direction; separate the two portions of muscle from each other exactly in the course of its fibres, then bring the arm to the side, which, by allowing of a wider separation, exposes more readily the parts beneath; at exactly one third of the length of the clavicle from its sternal extremity, you find the vein which is situated directly anterior to the artery, often concealed by fat and cellular membrane. To avoid wounding the vein the greatest care is requisite. For this purpose the dissection had better be carried on with the handle of the scalpel, after having divided the muscle,

## SUBCLAVIAN ARTERY ABOVE THE CLAVICLE.

This artery has been tied with success by Dr. Post of New York; a history of the case is published in the ninth volume of the *Medico Chirurgical Transactions*. I believe it has also been once successfully tied in Dublin, and once in Edinburgh. In England the operation has never succeeded. The late Mr. Ramsden, Surgeon to St. Bartholomew's Hospital, was the first who tied it; since which it has been secured at the London Hospital by Sir William Blizard, at Winchester by Mr. Mayo, in March 1822 I saw it tied at Guy's Hospital by Mr. Aston Key for a large aneurismal tumor extending from below the clavicle into the axilla; and in January last, for a similar disease, I saw it secured by Mr. Travers at St. Thomas' Hospital.

Make an incision three inches long just above the upper border of the clavicle, beginning half an inch from its sternal extremity, or immediately on the outer edge of the origin



of the sterno mastoid muscle; continue it through the integuments and platysma myoides, taking care not to wound the vein, which is situated before the artery, crossing it nearly at right angles; having separated it from the artery, it should be held on one side by an assistant; then feel for the eminence formed by the junction of the bony, with the cartilaginous portion of the first rib, on the outer side of which you find the artery; the nerves forming the axillary plexus are situated rather behind and to its outer side. Owing to the depth of the vessel considerable difficulty will be found in passing the ligature.

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### CAROTID ARTERY.

Till within the present century the operation of tying the carotid artery for the cure of aneurism had never been performed; a case requiring it was considered hopeless as being beyond the reach of remedy by surgical operation.

Harder relates an instance in which it was once attempted at the Hospital of la Charitè in Paris, according to the old method of opening the sac, and tying the vessel above and below ; but so great was the hæmorrhage that the patient died under the hands of the surgeon. Sir Astley Cooper was the first who secured the vessel by ligature for this disease, since which, the operation has been many times performed with success.

Begin the incision at the lower edge of the Thyroid cartilage ; continue it upwards and outwards through the integuments and platysma myoides for two inches and a half, immediately on the inner side of the sterno mastoid muscle, so as to form an angle with the Thyroid cartilage : dissect very carefully by the edge of the muscle, drawing it a little outwards, and the artery is found where it emerges from beneath that muscle and the Omo-hyoideus. Be careful not to wound the internal jugular vein, which is situated on the



outer side of the artery, and rather anteriorly; the nervus vagus is behind and to its outer side, and the descendens noni runs down the front of the artery: the whole is surrounded by condensed cellular membrane forming a kind of sheath.

### POSTERIOR TIBIAL AT THE ANKLE.

The patient being placed with his face downwards, make an incision two inches long between the inner malleolus and tendo Achillis, but nearer the former; cut through the aponeurosis, and you find the artery nearly under the malleolus, having the tibial nerve rather behind and to its outside, and an accompanying vein on each side.

### POSTERIOR TIBIAL RATHER BELOW THE MIDDLE OF THE LEG.

A little below the middle of the leg, begin an incision on the inner edge of the gastrocnemius; continue it obliquely for three inches in the direction of that muscle, so as to sep-

arate it from those beneath; elevate it with the upper part of the tendo Achillis, and on the first division of the muscle beneath, you find the artery with the nerve rather behind and to its outer side, and an accompanying vein on each side.

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**POSTERIOR TIBIAL HIGH UP IN  
 THE LEG.**

Begin the incision below and between the condyles of the femur; continue it through the integuments four inches down the middle of the calf of the leg; cut through the aponeurosis and gastrocnemius externus nearly to the same extent till you come to the internus, on the inner side of the outer head of which you find the artery, with the nerve situated anteriorly and to its outer side, and the vein rather before it.

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**POPLITEAL ARTERY.**

Begin an incision between the condyles of the femur, and continue it upwards for three



inches; the artery will be found deeply imbedded in fat, with the tibial nerve and popliteal vein situated more superficially.

### PERONEAL ARTERY RATHER BELOW THE MIDDLE OF THE LEG.

Let the incision be three inches long, parallel with the fibula, but behind its outer edge; a few muscular fibres will require to be divided; the artery may then be felt by passing the finger across the bone to its posterior and inner border, where it is situated, as it is small and deeply seated, there will be some difficulty in passing the ligature.

Mr. Guthrie, in the seventh volume of the *Medico Chirurgical Transactions*, has related a case in which he secured this artery higher up the leg, to suppress the hæmorrhage caused by a gun shot wound.

### ANTERIOR TIBIAL IN THE MIDDLE OF THE LEG.

Begin an incision rather below the middle of the tibia on its outer edge; continue it

upwards and outwards, for three inches, in the direction of the interspace of the tibialis anticus, and extensor longus digitorum muscles; cut through the fascia to the same extent, then separate the muscles, between which, on the interosseus ligament, you find the artery, having before it a branch of the peroneal nerve, and an accompanying vein on each side. These arteries, like the smaller of the upper extremity, require, when wounded, to be secured by two ligatures.

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### FEMORAL ARTERY IN THE MIDDLE OF THE THIGH.

The operation of tying the femoral artery where it is situated in the middle third of the thigh, for the cure of popliteal aneurism, was first performed by Mr. Hunter, and it is the operation now generally practised.

Put the Sartorius in action by placing the leg in the tailor's position; then make an incision, three inches in length, rather above



### 34 FEMORAL ARTERY IN THE GROIN.

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the middle of the thigh, in the oblique direction of the muscle, and on its inner edge: continue it through the integuments and fat, till the border of the muscle is exposed. Observe the direction of the fibres to ascertain that you have not come upon the Vastus, then, elevate the Sartorius, drawing it a little outwards, which brings the femoral sheath into view; open this with care, by a small incision, and then dilate it by cutting from within outwards; this exposes the artery, which has the vein rather behind and to its outer side.

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### FEMORAL ARTERY IN THE GROIN.

The patient being placed on his back, separate the thigh to be operated on from the other, and let the leg hang over the edge of the table; this renders the artery more superficial, by putting the integuments and sartorius muscle on the stretch. Begin the incision half an inch below the middle of Poupart's

ligament; continue it downwards for three inches, inclining it slightly to the inner side of the thigh, taking care to avoid the saphena vein which is rather superficially seated, and nearly over the artery. Having cut through the integuments, fat, aponeurosis, and fascia lata, you come to the sheath of the vessels. This being cautiously opened, as in the last operation, exposes the artery, which has the vein on its inner side, but separated from it by a process of the sheath: the anterior crural nerve, not included in the sheath, is a little to its outer side. An interesting case of ligature on this artery, for a wound of the vessel caused by a hay-fork, is related by Mr. Norman of Bath, in the tenth volume of the Medico-Chirurgical Transactions.

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#### EXTERNAL ILIAC.

Mr. Abernethy was the first who tied this vessel for inguinal aneurism. He made his incision in the direction of the artery, and



secured it by two ligatures. The operation has since been repeatedly performed with success. From the number of cases published, the following appears to be the most general method of securing the vessel.

The hairs being previously shaved from the part, begin the incision about an inch within, and rather below, the anterior and superior spinous process of the ilium; continue it, in a semilunar form, in the direction of Poupart's ligament, for a little more than three inches, so as to make it terminate just above the external abdominal ring: this exposes the tendon of the external oblique muscle, which being divided to the same extent, and turned aside, lays bare the internal oblique, where it arises with the transversalis from the outer half of Poupart's ligament. With your finger, or the handle of the scalpel turn up the borders of these muscles, and the spermatic cord becomes exposed; pass your finger behind it, push the peritoneum upwards,

and you feel the artery with the vein on its inner side; they are closely connected by cellular membrane, and must be carefully separated with the handle of the scalpel, or a blunt probe. After having cut through the tendon of the external oblique, be careful to use the knife as little as possible, lest you wound the epigastric artery, which is generally situated near the inner extremity of your incision, crossing behind the spermatic cord. This accident happened to the celebrated surgeon Mons. Dupuytren, when performing the operation at the Hotel Dieu in Paris, in the Autumn of 1821: the hæmorrhage was so copious, that two ligatures were required on the wounded vessel: the patient afterwards died of peritonitis.

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### INTERNAL ILIAC.

This artery has been tied by Mr. Stevens of Santa Cruz in the West Indies, and by Mr. Atkinson of York; the former case ter-



minated successfully, and is published in the fifth volume of the Medico-Chirurgical Transactions. I shall give the operation in the words of Mr. Stevens.

“An incision about five inches in length, was made on the left side, in the lower and lateral part of the abdomen, parallel with the epigastric artery; and nearly half an inch on the outer side of it. The skin, the superficial fascia, and the three thin abdominal muscles were successively divided; the peritoneum was separated from its loose connection with the iliacus internus and psoas magnus, it was then turned almost directly inwards, in a direction from the anterior superior spinous process of the ilium, to the division of the common iliac artery. In the cavity which I had now made I felt for the internal iliac, insinuated the point of my fore-finger behind it, and then pressed the artery between my finger and thumb. I then passed a ligature behind the vessel and tied it about half an

inch from its origin. I found no difficulty in avoiding the ureter: when I turned the peritoneum inwards the ureter followed it. Had it remained over the artery I could easily have turned it aside with my finger. The woman did not complain of much pain and I am certain she did not lose one ounce of blood."

This artery is also said to have been successfully tied in Russia, by an army Surgeon, upon whom the Emperor Alexander has since settled a pension, as a reward for the dexterity and skill, displayed in the treatment of the case.

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## THE AORTA.

In a case of aneurism of the common iliac artery, which had given way, and when there was no other hope, or chance of saving the patient than by obliterating the aorta, Sir Astley Cooper put a ligature on that vessel, he having been previously satisfied by experiments on the canine species that the circu-



lation could be carried on, by collateral branches, when that artery was closed. The case is published in the first volume of his Surgical Essays, from whence I extract the following account of the operation.

“The patient’s shoulders were slightly elevated by pillows, in order to relax as much as possible, the abdominal muscles; for I expected that a protrusion of the intestines would produce embarrassment in the operation, and was greatly gratified to find that this was prevented by their empty state, in consequence of the involuntary evacuation of the fæces; and here let me remark that I should, in a similar operation, consider it absolutely necessary, previously to empty the bowels by active aperient medicines.

I then made an incision three inches long into the linea alba, giving it a slight curve to avoid the umbilicus: one inch and a half was above, and the remainder below the navel, and the inclination of the incision was to the

left side of the umbilicus in this form (∩)  
Having divided the linea alba, I made a small aperture into the peritoneum, and introduced my finger into the abdomen; and then, with a probe-pointed bistoury, enlarged the opening into the peritoneum to nearly the same extent as that of the external wound. Neither the omentum nor intestines protruded; and during the progress of the operation, only one small convolution projected beyond the wound.

Having made a sufficient opening to admit my finger into the abdomen, I then passed it between the intestines to the spine, and felt the aorta greatly enlarged, and beating with excessive force. By means of my finger nail, I scratched through the peritoneum on the left side of the aorta, and then gently moving my finger from side to side, gradually passed it between the aorta and spine, and again penetrated the peritoneum on the right side of the aorta.



I had now my finger under the artery, and by its side, I conveyed the blunt aneurismal needle armed with a single ligature behind it; and my apprentice, Mr. Key, drew the ligature from the eye of the needle to the external wound; after which the needle was immediately withdrawn.

The next circumstance, which required considerable care, was the exclusion of the intestine from the ligature, the ends of which were brought together at the wound, and the finger was carried down between them, so as to remove every portion of the intestine from between the threads: the ligature was then tied, and its ends were left hanging from the wound. The omentum was drawn behind the opening as far as the ligature would admit, so as to facilitate adhesion; and the edges of the wound were brought together by means of a quilled suture and adhesive plaster."

**EXTIRPATION OF THE BREAST.**

In the history of the principal operations of Surgery, translated from the German into French, Leonidas of Alexandria is stated to have been the first who prescribed this operation as requisite in all cases in which the gland was cancerous. He adopted the following method of operating. Having placed his patient on her back, he made his first incision through the healthy integuments, to which cut he immediately applied the actual cautery to prevent hæmorrhage, and then made a second deeper than the first, which he burnt in a similar manner, and thus continued cutting, and cauterizing alternately, till he had removed the breast; when he finished the operation by again burning the whole surface of the wound, so as to destroy any portion of disease which might have been remaining. On so cruelly painful a process no comment is necessary.

A schirrous enlargement of the gland is the



cause which most frequently necessitates the performance of the operation, in executing which it is requisite to bear in mind, that all the skin directly connected with the tumor, and the cellular membrane surrounding it, to the extent of half an inch, should be taken away: on this the happy result of the operation, in a great degree, depends.

The patient being seated on a chair, the operator places himself before her, when an assistant puts the pectoral muscle on the stretch by raising the arm from the side. The operator then, with the fingers of his left hand placed parallel to the course of his first incision, draws the integuments tense, and makes the cut on the outer and under side of the tumor, of a semilunar form, extending obliquely from above downwards. The corresponding incision is then to be made, beginning and terminating at the same points as the former, but passing on the other side of the tumor, enclosing as much of the integument as may

be deemed sufficient, which the operator puts on the stretch by pressing it from him with his left thumb. The dissection, commenced at the upper and outer part, is to be continued obliquely from above downwards, in the direction of the fibres of the pectoral muscle, till the tumor is separated.

If the dissection be attempted from below upwards, it is probable that the lower edge of the pectoral muscle will be raised; and if it be continued from the inner incision, the blood collects before the point of the knife, obscuring the dissection and rendering it more tedious.

Should a gland in the axilla be enlarged, the incision must be extended so as to remove it with its connecting medium. It should first be raised from its seat with a double tenaculum, and then cut away. This, pulling it from its situation, prevents the artery leading to it from retracting so as to escape detection after being divided. Hæ-



morrhage occurring during the operation, may be restrained by the assistant pressing his finger on the bleeding orifices till it is completed, when the divided arteries must be secured by ligatures, and the borders of the wound approximated by adhesive plaster.

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### BRONCHOTOMY.

This operation is said to have been first performed in the time of Cicero, by Asclepiades; and a great number of patients are said to have been then saved by it, who were in danger of perishing from suffocation.

When respiration becomes impeded by disease, as in severe cases of croup; or when some extraneous substance is deposited in the air tube, this operation is found to be most effectual in either restoring the one, or removing the other. It is also occasionally adopted in cases of suspended animation from drowning, to allow of more readily inflating the lungs, when a proper apparatus for

that purpose is not at hand. For the first of these cases it may be done as follows.

Place the patient on his back, with his head resting on pillows and inclined backwards as much as the difficulty of breathing will permit. The operator then, sitting on the right side, feels for the space between the thyroid and cricoid cartilages, directly over which, in the intermuscular division, he makes a perpendicular incision from half an inch to an inch in length. He then places his left fore-finger on the ligament connecting the thyroid to the cricoid cartilage, along which he directs the straight bladed bistoury into the air tube and cuts a little laterally on each side between the two cartilages. Should this opening not be sufficient for a free admission of air, it may be enlarged by continuing the incision downwards so as to divide the cricoid cartilage, a small portion of which Mr. Lawrence cuts away to prevent the wound closing; that being preferable to



the introduction of a tube which often causes excessive irritation.

When there is a foreign body to be extracted, the opening is to be made in the same manner, but continued through the first two or three rings of the trachea, according to the size of the substance to be withdrawn; feeling with the fore-finger to avoid wounding the superior branch of the thyroideal artery, or the thyroid gland. If the substance be not immediately expelled by the force of the air passing from the lungs through the artificial opening, it should be seized, if practicable, by a small pair of forceps and taken away. The lips of the wound should then be brought together and the patient kept at rest.

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### ÆSOPHAGOTOMY.

When any foreign substance is lodged in the Æsophagus that can neither be withdrawn by the fingers nor forceps, nor pushed onwards to the stomach by the probang; but

continues to prevent deglutition, and by its pressure on the back part of the trachea or larynx threatens suffocation, an operation for its removal becomes requisite, which Mons. Lisfranc recommends to be thus performed.

The patient should be seated in a chair, with his head reclining backwards on the breast of an assistant; the operator placing himself in front, takes the scalpel or bistoury, and, holding it like a pen, commences his incision on the inner border of the left sterno-mastoid muscle, opposite the superior edge of the thyroid cartilage, and continues it down to the lower edge of the cricoid. An assistant now draws the carotid sheath to the outer edge of the wound to secure it from the knife; while the operator, cutting carefully through the cellular tissue, exposes the œsophagus, where it inclines to the left side from behind the trachea. A canula with a grooved stilet, or the sonde à dard formed like a female catheter, but considerably



longer, is to be passed by the mouth down the æsophagus, inclining its point to the left side, which causes it to be readily felt from the external wound. The stilet is now to be pushed forwards through the coats of the æsophagus, when the operator feels with his finger along its concave edge, to ascertain that no large arterial branch be situated on it, and then passes a bistoury into the groove, which directing it onwards opens the æsophagus. He now feels for the foreign substance, which is to be extracted by a pair of dressing forceps passed along his finger.

During the operation, an assistant should carefully sponge away the blood after each cut of the knife, and should any arterial branch be divided, though little hæmorrhage followed, it should be immediately secured, or it would render the operation much more tedious and obscure. The edges of the wound are to be approximated and a light bandage applied. The patient is to be kept at rest

and no nourishment given him by the mouth for a few days, but his strength must be kept up by nutritious clysters.

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### HARE-LIP.

This malformation may be either single or double. When there are two fissures it is thought best to operate on each separately, and not endeavour to unite both at the same time. As it is mostly congenital, it becomes a question at what period after birth the operation may be performed so as not to endanger the welfare of the patient, and at the same time give the most reasonable hope of success. On this there have been various opinions, some having postponed the operation till the child has been five or six years old, others having operated as early as six weeks after birth: among the latter number is Roonhuysen, a surgeon of Amsterdam who lived in the seventeenth century, and who is said to have had extraordinary success. For



many hours previous to the operation he invariably prevented the child from sleep, which generally caused it to remain quiet for some time after. This method of operating soon after birth is now however seldom followed, it having in some cases brought on convulsions, of which the children have died; it is therefore now rarely performed before two years of age, and if it be postponed to a later period the success may be said to be more certain, as the lip becomes better adapted for supporting the sutures, and there is less danger of its speedy ulceration, which would require the operation to be repeated.

In England the operation is generally performed with the knife, and the cut edges approximated by sutures; at the Hotel Dieu in Paris I have always seen the borders of the fissure removed by the scissars, and needles with the twisted suture used for keeping its edges in apposition. Each mode may have its advantages; the wound made by the knife

being cleaner and more regular throughout its whole surface, of course is better adapted for uniting readily by adhesion; while with the scissars the operation is more quickly performed, and less blood lost; which latter circumstance may be of consequence if the subject be very young.

At St. George's Hospital the operation is performed with the knife edged scissars, made by Mr. Stodart in the Strand, to which the above objection does not apply.

In operating with the knife, the patient is to be seated on a chair, or, if a child, placed on the knees of an assistant, whose breast forms a support for the head, while his hands placed on the cheeks, keep it steady, and his index fingers pushed forward approximate the edges of the fissure. The operator then, with a straight sharp pointed bistoury, divides any unnatural adhesions between the lip and gum, and places under the right side of the lip, a thin piece of polished wood,



which he supports by the index and middle fingers of the left hand below, and the thumb pressing on the lip above.

Holding the bistoury as a pen, he now thrusts it through the lip, above the angle of the fissure, as high up as the inferior margin of the nostril, or the septum of the nose, and removes the border by cutting obliquely through the lip towards himself. He then places the wood beneath the other side of the fissure, and supports it with the two fingers, the assistant pressing the half lip above towards its fellow; the bistoury is to be thrust through at the same point as before and the other border removed, leaving a cut corresponding at every part with the opposed, and forming an angle more or less acute. The suture, formed of a double waxed thread, is now to be passed from without inwards; in doing which the needle is to be held between the thumb and middle finger of the right hand, the index resting on its top, and

pushed through the left side of the lip at the junction of the villous part with the integument, and about half an inch from the cut border; it is then continued from within outwards at a corresponding point on the opposite side. The needle with a part of the thread is then cut away: the operator takes hold of the ends of the suture, and by drawing them downwards, approximates the edges of the wound; an assistant keeping them in that position, the second suture must be passed midway between the first and the apex of the angle, in the same manner as the former. The lower suture is then secured, and afterwards the upper, taking care that the cut surfaces be in exact contact. No plaster or bandage is required till the sutures are removed, which should be about the fifth day, when they are to be snipt with the scissors; a bandage may then be applied and continued for a few days till the union has become more solid.



### OPERATION WITH THE SCISSARS.

The patient being fixed as in the former operation; the operator takes hold of the right side of the lip between the thumb and index finger of his left hand; and opening the scissars he places the lip between the blades and cuts away the border of the fissure at one snip: then taking the inferior part of the left border between the thumb and finger, he removes it in a similar way, observing that the two cuts unite at the apex of the angle.

The needles are now to be applied; common steel ones are said to be as good as any; at one of the largest hospitals in France, the Hotel Dieu at Lyons, these only have been employed for many years. The point being previously greased, it is held between the thumb and middle finger of the right hand, the index resting on its top, and pushed into the lip about a quarter of an inch from the cut border, and just above the junction of the villous part with the integu-

ment; it is continued forwards obliquely, so as to pass through about two thirds of the substance of the lip, and make its appearance just above the inner border of the cut surface; it is then made to enter the opposite side of the wound at a similar point, and is pushed onwards till it has pierced the integuments, its course corresponding to the preceding.

The extremities of this needle are to be encircled by a waxed thread passed behind them, which an assistant draws downwards, so as to bring the cut edges in contact at the upper part, where the second needle is applied in a similar manner. The ends of the thread are now carried round the extremities of the lower needle several times, crossing each time on its middle and forming a figure of 8; they are then to be made cross each other between the two needles, and carried round the ends of the upper one, on which a similar figure is to be formed



passing the threads under its extremities and over its middle as before. This being repeated a sufficient number of times to keep the edges of the wound in contact, the ends of the thread are to be made fast, and a small bolster of soft linen placed beneath the needles on each side the wound, to prevent the extremities giving pain by pointed pressure on the lip. The needles are removed about the fifth or sixth day, the inferior one being first taken away.

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#### REMOVAL OF A PART OF THE INFERIOR MAXILLARY BONE.

This operation has been performed with complete success by M. Dupuytren, Surgeon to the Hotel Dieu in Paris: the whole of the chin was the part taken away. I am not certain as to the nature of the disease for which the operation was had recourse to; but it appears that it may be required for exostosis, necrosis, or a cancerous affection

of the bone. Each of these diseases would perhaps call for a slight variety in the operation according to the circumstances of the case.

The following is the method in which M. Lisfranc recommends it to be practised on the dead subject.

The body being placed on its back with its head lowered, and chin elevated, an assistant takes hold of one side of the lower lip between his thumb and fore-finger, while the operator, standing behind the head, in like manner fixes the other. An incision is then made from the middle down to the os hyoides; if it be only chin that is to be removed this cut will be sufficient, but if a larger portion be to be taken away, another will be necessary, made along the anterior part of the bone so as to form a cross. The skin, which adheres firmly, is to be dissected back on both sides, and the bone denuded, by dividing the periosteum with the knife at



the part to be sawed through. M. Dupuytren directs the periosteum on the posterior part of the bone to be cut, by thrusting the knife upwards behind it, and turning its edge towards the bone; but M. Lisfranc objects to this, as it may probably wound vessels which, in the living subject, would furnish considerable and even dangerous hemorrhage.

The saw is now to be applied, and the bone, being steadily fixed by an assistant, sawed through obliquely that it may come in perfect contact with its opposed portion, which is to be cut through at the corresponding point. In order to avoid wounding the nose or upper lip while sawing through the bone, those parts should be shielded from the teeth of the instrument by a pad of soft cloth. The division of the bone being effected, its separation from the soft parts is to be completed with the knife. The hæmorrhage produced by such an operation on

the living subject, should be suppressed by drawing out the tongue, seizing with a tenaculum such arteries as can be detected, and securing them by ligatures, after which, if blood still continues to flow from invisible sources, the actual cautery is directed to be applied. The extremities of the bone are then to be placed in perfect coaptation, and the edges of the wound brought into contact; pads of lint are to be placed so as to produce compression, and the whole kept together by a roller judiciously applied. Previous to the operation it will be requisite to extract one or two teeth on each side, at the part where the bone is to be sawn through.

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### WRY NECK.

When this deformity is occasioned either by spasmodic contraction of one of the sterno mastoid muscles, or paralysis of the other, it may sometimes be relieved by an operation. In a case of the former kind it



would be requisite to divide some of the fibres of the diseased muscle; in the latter a sufficient quantity of the corresponding healthy one would require to be cut, in order to establish an uniformity of action between the two.

The history of the following case may serve as a guide in practising the operation, as well as one proof of its success.

A little girl about ten years of age, whose neck, or rather whose head, had been awry for three years, owing to a permanent spasmodic contraction of the sterno mastoid muscle of the right side, was admitted into the Hotel Dieu Paris early in January 1822. On the sixteenth of that month the operation was performed by M. Dupuytren as follows.

The patient reclining against an assistant, a puncture was made, with a straight narrow bladed bistoury, through the integuments just on the inner border of the sternal extremity of the contracted muscle. The

blade of the bistoury, being flatly opposed to the muscle, was pushed cautiously behind it, the point being directed forwards and outwards till it protruded just on the outer side of the clavicular border. The edge of the bistoury was then turned towards the muscle, and a sufficient quantity of its posterior fibres cut to allow of the head being placed erect: the instrument was then withdrawn.

In this way the integuments escaped being divided, and a future scar was prevented; a very desirable object, the patient being a female.

The cut edges of the muscle were kept asunder by depressing the clavicle, and inclining the head to the left side. The former was effected by binding the right hand firmly to the foot, the knee being bent; thus the clavicular fibres of the deltoid drew the bone downwards; the latter by a roller passed round the head and under the left axilla.



The patient was kept in bed; and at the end of thirteen days the punctures were healed, and she had free motion of the neck, though from long continued habit, she still turned her face to the left side. The bandages were reapplied, and the same bodily position maintained till the twenty-first of February, when they were finally taken away, and the patient pronounced cured, the head being but very slightly inclined to the right side, and having free motion in every direction.

In operating on the male, the fibres may be cut on the anterior surface of the muscle, an incision being first made through the integuments. Inclining the head to the opposite side by a roller and filling the wound with lint, will then be sufficient to keep its cut edges asunder.

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#### PARACENTESIS ABDOMINIS.

When medical treatment is found insufficient for removing the fluid collected within

the peritoneum in cases of Abdominal dropsy, the operation of tapping the belly is had recourse to in order to evacuate it. This operation appears to have been performed in the earliest days of Surgery, and never to have been considered either very dangerous, or difficult to execute, as it is related that Peter the Great once performed it, and drew away forty measures of fluid. However simple it may be deemed, it is not wholly without danger, as well authenticated cases are related in which the epigastric artery has been wounded and the patient has died of hæmorrhage.

The patient being seated on a high chair, a long cloth or towel should be passed round the upper part of the abdomen, and fixed securely behind by an assistant, this presses the fluid downwards, and at the same time gives support to the diaphragm, preventing its sudden descent, which would otherwise be very apt to produce syncope. The opera-



tor, seated in front on a low chair, takes the common straight abdominal trochar, previously smeared with oil, in his right hand, and holding the handle firm in the palm, he places on the canula his index finger, which not only prevents the trochar entering too far, but also serves as a guide to the instrument. In this manner, about an inch and a half below the umbilicus in the linea alba, it is to be steadily thrust through the integuments and other abdominal parietes, giving it a slight rotatory motion, as it is pushed forwards. Its entrance into the abdomen is rendered evident by the cessation of resistance. By making the puncture at this part, the danger of wounding the epigastric artery is avoided, unless it deviates considerably from its natural course.

The operator then, with the thumb and index finger of the left hand, gradually pushes forward the canula while, with the same fingers of the right, he withdraws the stilet.

The fluid is to be received in a vessel of sufficient size to contain the whole ; the towel or cloth which encircles the abdomen being proportionably tightened as it flows away. Should the orifice of the canula be stopped by lymph or omentum, it must be removed by introducing a blunt probe or director along the tube. The water being evacuated, the canula is to be taken between the index and middle fingers and the thumb of the right hand, and withdrawn slowly, while with the same fingers of the left, pressure is made on the borders of the wound. A pad of lint should be placed on the puncture, a broad flannel roller applied round the abdomen to give the requisite support, and the patient returned to bed.

Some of the French surgeons in puncturing the abdomen, employ a curved trochar similar to that used in England for puncturing the bladder by the rectum. This they plunge through the abdominal parietes at the middle



point between the umbilicus, and anterior and superior spinous process of the ilium; the patient lying on the edge of the bed, on the side on which the puncture is made. They choose the right side, as they say the large intestines are more floating at that part on the left, and therefore are in some danger of being wounded.

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### PARACENTESIS THORACIS.

The recovery of persons from wounds which had penetrated the chest, first led to the performance of this operation, which, although many instances are related of its success, it would by no means be prudent to attempt in all cases of hydrothorax; that disease being generally accompanied by some organic affection, either of the chest or abdomen. When hydrothorax is the result of an acute disease, as pleurisy, or pneumonia, or follows the suppression of some long continued discharge,

and the patient is young, or middle aged, and in other respects healthy; it would be wrong not to perform the operation, as the case holds out every probability of terminating well. Baron Larrey in his *Mémoires de Chirurgie Militaire*, relates numerous instances in which he has performed the operation; both for effusions of blood, and matter within the cavity of the chest, in many of which cases his patients recovered. The space between the sixth and seventh true ribs, where the digitations of the external oblique muscle join those of the serratus magnus, is the part at which it is recommended to make the puncture provided there be no other rendered prominent by the pressure of the fluid, which, if there be, should always be preferred. A trochar should not be used, as there would be danger of wounding the lungs or diaphragm; a straight bistoury, or a scalpel is the only instrument required, and the operation may be done as follows.



Place the patient in the half-erect position, and make an incision upon the seventh rib, by taking up a fold of integument and cutting in the direction of the bone for two inches. Dissect the integument upwards from the rib and intercostal muscles. The left index finger may then be introduced if necessary to feel the superior border of the rib, and the intercostal muscles divided close upon it, to the extent of half an inch, and a small opening made in the *Pleura Costalis*, taking care that the point of the knife does but just enter the chest. The flap is then brought down, the wound closed, and a director carefully passed through it so as to evacuate the fluid without allowing the admission of air into the cavity of the *Pleura*. This is afterwards avoided by a compress on the valvular flap, which, if skilfully applied, will serve to prevent the occurrence of *Emphysema* in those cases in which the lung has been opened by the bursting of an abscess into the

Pleura : and by the above mode of operating the intercostal artery, running along the lower margin of the sixth rib, cannot be endangered.

If there be much fluid in the thorax a part only should be evacuated, and then the compress placed over the wound till the next day, when it may be removed, and the remainder let out ; by this gradual evacuation, the lungs will return by degrees to their original state, and thus the presence of air in the chest will be the more surely prevented. When there is fluid collected in both Pleuræ, an operation on each side will be required, which must be performed at distant periods, or the patient may be suffocated by the admission of air into both sides of the chest at the same time.

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## PUNCTURING THE PERICARDIUM.

Mons. Boyer, in his *Traité des Maladies Chirurgicales*, observes ; when without swer-



ving from the path of prudence it is thought necessary to perform this operation, the method recommended by M. Skielderup, Professor of Anatomy at the University of Christiana in Norway, should be preferred, it being less hazardous than any other. It consists in making a crucial incision through the integuments, removing a portion of the sternum by means of the trephine, and then puncturing the pericardium. The operation is directed to be performed, immediately below the part where the cartilaginous portion of the fifth rib unites with the sternum. Here the approximating layers of the two pleuræ leave an intervening triangular space, which is part of the anterior mediastinum, situated a little more to the left than to the right, and which is filled by cellular membrane; its apex rising as high as the fifth rib, its base resting on the diaphragm. Thus, after having trephined the sternum at the part above mentioned, the pericardium may

be opened without wounding the pleura; consequently the chest will not be penetrated. The crown of the trephine used should be of sufficient size to leave an opening in the sternum, the dimensions of which will admit the left index finger; this finger at the same time that it discovers the part at which fluctuation is most discernible, serves as a conductor for the bistoury, with which the pericardium is to be punctured. After having cut through the bone of the sternum, the condensed membrane or ligament lining its inner surface, will offer considerable resistance to the crown of the trephine, which should then be laid aside, and the adhesions divided by the bistoury. Should any hæmorrhage follow, the operation should not be continued until it has ceased. Before making the puncture in the pericardium the body of the patient should be inclined forwards.

M. Richerand has supposed it possible to perform a radical cure for dropsy of the



pericardium, by making a large opening in the sternum, opposite the heart, and incising a portion of the membrane, between the layers of which he conceives the admission of atmospheric air would be a sufficient stimulant to excite adhesive inflammation.

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### PUNCTURING THE BLADDER.

In cases of retention of urine in which relief cannot be obtained by medical treatment, and when the introduction of the catheter is found impracticable, the distention must be removed, or inflammation may speedily ensue; the urine may escape by means of ulceration or gangrene, and being effused into the cellular membrane produce extensive sphacelation if not death: the operation of puncturing the bladder therefore becomes necessary.

There are three methods of performing this operation; by the rectum, above the pubes, and through the perineum. Each of these

methods may have its advantages, and each has its particular advocates. The late Mr. Hey, Sir Everard Home, and Mr. Forster, being in favour of the first, Mr. Abernethy of the second, and Sir Astley Cooper generally preferring the third.

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### OPERATION BY THE RECTUM.

The patient being seated on the edge of the bed, with his legs held up as in the operation for the stone, an assistant with his left hand, presses on the abdomen just above the pubes, and with his right raises the scrotum. The operator kneeling on his right knee, or sitting on a low chair, passes his left index finger, previously greased, into the rectum; and feeling behind the prostate gland, he discovers that part of the distended bladder which is situated between the vesiculæ seminales. Half bending his finger he rests its extremity on this point, and passes along its anterior surface the curved trochar, which



should be from four to five inches long: this he pushes obliquely forwards into the bladder in a direction, which, if continued, would puncture the parietes of the abdomen midway between the umbilicus and pubes, in the linea alba. The finger is now withdrawn from the rectum; when, holding the canula between the thumb and first two fingers of the left hand, with the right the operator takes away the stilet, and the urine flowing away, is received in a bason. The canula should be retained in the bladder for a day or two, when it may be removed, and the urine allowed to flow by the rectum, if the natural passage continues obstructed.

The principal objections to this operation are the following. The *Vesiculæ Seminales* may chance to be wounded; the presence of a canula in the rectum often causes tenesmus, or inflammation of that gut; a small portion of faecal matter may pass by the opening into the bladder, and form a nucleous for a future

stone; and lastly the passage of the urine by the rectum mostly produces great irritation and excoriation of the surrounding parts.

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### OPERATION ABOVE THE PUBES.

The same trochar as used in the last operation is required for puncturing the bladder above the pubes. This is the method generally preferred by French surgeons, who perform it thus.

The patient being placed on the edge of his bed reclines backwards against an assistant, with his thighs slightly bent towards the abdomen. The surgeon standing in front can observe, if the patient be thin, the circumscribed prominence formed by the distended bladder above the pubes; he then places his left index finger on the point where he purposes introducing the trochar, which is one inch and a half above the pubes in the linea alba. The handle of the instrument being held in the palm of the right hand, with



the index finger resting on the canula, the trochar is pushed through the integuments, directing its point backwards and downwards in the direction of the axis of the bladder, its entrance into which is made manifest by the cessation of resistance, the easy motion of the instrument, and the dribbling of a little urine. The canula is now held between the thumb and first two fingers of the left hand, while the stilet is withdrawn with the right, the patient resting on either side, and reclining forwards as the urine flows away. In proportion as the bladder is emptied its coats retract; it is therefore requisite to push forwards the canula to prevent its slipping off its extremity. As soon as the fluid is completely drawn away, the open end of the canula is stopped by a cork; and by means of tape, passed through the rings of its outer extremity, round the pelvis, it is fixed in the bladder. In the course of seven or eight days it is withdrawn, as calculous concretions are apt

to form round it, first passing through its tube an elastic gum catheter. The chief objection to this operation is the possibility of the bladder escaping from the instrument, and thus producing extravasation in the surrounding cellular membrane, as well as the necessity of constantly wearing a catheter, or canula in the bladder.

Mr. Abernethy in performing the operation, first separates the muscoli pyramidales from each other, by making an incision about two inches in length through the integuments and between the muscles. By this opening the distended bladder is readily felt, into which the trochar is introduced as before. The danger of extravasation into the surrounding cellular membrane is thus removed, by the urine passing readily off through the external wound.

#### OPERATION BY THE PERINEUM.

The patient being placed in the same posi-



tion as in the operation for the stone, an assistant presses the bladder downwards from above the pubes. The operator, seated on a low chair, takes the scalpel, and, holding it like a pen, commences the incision on the left side of the raphe, between the bulb and crus penis, and continues it obliquely downwards and outwards for an inch and a half. Having reached the bulb, he presses it, with his left index finger, to the right side, and feels forwards for the prostate gland and distended bladder. The trochar, which should be straight and not less than three inches and a half in length, is to be pushed into the bladder, by the side and at the base of the prostate gland. The stilet being withdrawn and the bladder emptied of its contents, the canula may be removed, and a female catheter substituted, which should be there retained by means of tape passed through its rings round the pelvis, from before backwards, and vice versa.

This operation is the most difficult to perform of the three, and requires considerable caution, with an exact knowledge of the relative position of the parts, to enable the operator to steer clear of the surrounding danger, otherwise he may wound the vas deferens, the vesiculæ seminales, the ureter, the prostate, or the rectum; or he may pass the trochar between the rectum and bladder, and be foiled on withdrawing the stilet by finding no urine issue from the tube.

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### LITHOTOMY.

A stone may be removed from the bladder by an incision made into that viscus, either through the perineum or above the pubes. The former operation, when the prostate gland is cut sideways, is denominated the lateral; the latter, the high operation.

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### LATERAL OPERATION.

The method of opening the bladder by



cutting the prostate gland laterally, was first performed towards the close of the seventeenth century by Jacques Baulot, commonly called Frere Jacques, a French monk, who, without any knowledge of anatomy, journeyed about the country performing the operations of Lithotomy and Hernia. He executed the former by first passing a catheter and then, with a double edged knife, cutting by its side through the perineum, straight forwards into the bladder. By this opening he introduced his finger or a director, passed the forceps along its surface, and having pulled out the stone, left the patient exclaiming "L'opération est achevée; Dieu vous guérise? In this way he operated, at the hospital of la Charité and the Hotel Dieu in Paris, on sixty patients twenty five of whom died; and on examining the parts after death it was found in many cases, that he had not only opened the bladder but had also made free incisions into the rectum.

In the hands of Cheselden, a well educated man, a good anatomist, and an experienced surgeon, this operation was considerably improved. He divided the urethra, from its membranous portion to the prostate gland, by cutting with the knife on a grooved staff, and opened the bladder with the blunt gorget, pushing it through the substance of the prostate gland. His knowledge of anatomy kept him from committing the blunders of Frere Jacques; consequently his operations were followed by more happy results; indeed his success was most extraordinary, as out of fifty-two patients on whom he operated at St. Thomas' hospital, two only died.

The operation is at present said to be performed with the greatest success in the Norfolk and Norwich hospital. Mr. Martineau, senior surgeon to that institution, has, in the eleventh volume of the Medico-Chirurgical Transactions, given a statement of eighty four unselected cases, being all



those on which he has operated between the years 1804 and 1820; out of which number two only died. Mr. M. in executing the operation, divides the prostate gland with the knife and uses the blunt gorget merely as a conductor for the forceps.

There are three instruments invented for cutting the prostate gland in this operation; each of which has its particular advocates among Surgeons of the present day. First, the knife, the most ancient method, is preferred by many; second the lithatome cachè, invented by Frere Come, a French surgeon, is generally employed in the hospitals at Paris; and third the cutting gorget, first used by Sir Cæsar Hawkins at St. George's hospital; this latter is perhaps the instrument in most frequent use among English surgeons. Of the first and last again, the form is varied; the knife invented by Sir Astley Cooper, and that of Mr. T Blizard, each of which has a beak at its extremity, are prob-

ably most commonly employed; while the gorgets of Mr. Cline, Sir Astley Cooper, and Mr. Abernethy, have each of them respective defenders among Surgeons who give the preference to that instrument. The operation with the knife may be performed thus.

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### LATERAL OPERATION WITH THE KNIFE.

The patient being seated on the edge of a table of convenient height, his back supported by pillows, his thighs separated, elevated towards the abdomen, and the soles of his feet grasped in the palms of his hands; a bandage is looped round each wrist, and continued, encircling each ankle, wrist, foot, and hand; so as to bind firmly the hands to the feet: another bandage may be passed from under each ham over the shoulders, and fastened behind the neck. The position will be still better preserved by an assistant



standing on each side, giving further support to the limbs, and keeping the thighs separated by slightly pressing the knees outwards.

The operator then taking the grooved staff, smeared with oil, between the thumb and first two fingers of his right hand, passes it into the bladder, and having felt the stone rests its extremity against it. An assistant, standing on the patient's left side, takes hold, with his right hand, of the handle of the staff, which he keeps steadily fixed, nearly perpendicular, but slightly inclined to the right side. The operator seated on a low chair, with a double edged scalpel, held like a pen, makes his first incision through the integuments and fat, beginning about an inch below the symphysis pubis, close to the raphe on its left side, and continuing it obliquely downwards and outwards, between the anus and tuberosity of the ischium; dividing the intermediate space into three parts,

it finishes exactly at the point where the outer and middle parts join, and from whence a line, if passed across the anus, would separate it into two equal portions. The next incision is between the crus and bulb of the penis, through the accelerator muscle, which lays the bulb bare; this being pushed aside by the left index finger, the transversales perinæi muscles are divided in the direction of the external wound. With the same finger, beyond the bulb, the operator feels the staff where it is situated in the membranous portion of the urethra, by cutting through which with the point of his knife he opens into the groove. Keeping the nail of his forefinger in the groove, he takes the knife with which he purposes dividing the prostate, and passing it along his finger, fixes its beak in the groove of the staff; then, rising from his seat, he takes the handle of the staff between the thumb and first two fingers of his left hand, and, bearing it towards himself,



slides the knife forwards along the groove into the bladder. The prostate is now to be divided by drawing out the knife, at the same time cutting through the gland in a direction downwards and outwards, which being finished the staff may be withdrawn.

The left forefinger is then to be passed by the wound into the bladder, and the forceps flatly introduced along its surface, when it may be removed. The stone being felt for, with the blades of the forceps closed, and discovered, should be seized between them, if possible, in the direction of its long diameter, and drawn slowly out; alternately raising and depressing the instrument, or if the stone be irregularly formed, inclining it from side to side, keeping at the same time the first two fingers of the left hand between the handles, thus preventing the stone from being broken by the too forcible approximation of the blades.

## LATERAL OPERATION WITH THE LITHATOME CACHÉ.

This instrument, generally employed by French surgeons, is recommended to be used as follows. The patient is to be placed, and the operation proceeded with as before, till the staff is laid bare, the operator keeping the nail of his left index finger resting in the groove. He then takes the Lithatome caché by the handle, its blade being properly set, and passes it along his finger until its beak enters the groove of the staff, which is proved by making its point pass backwards and forwards along it. Now rising he takes hold of the staff with his left hand, and whilst he depresses it so as to make it perform a semi-circle, pushes the Lithatome along the groove into the bladder, and then withdraws the staff. The instrument being in the bladder is to be lifted upwards to avoid the rectum, and pressed towards the patient's right side to steer clear of the left pudic artery. These cautions



being observed, and the concealed blade inclined so that in coming forth it will cut the prostate downwards and outwards, the handles are to be approximated, the blade raised, and the gland being cut as just directed, the instrument is to be withdrawn in the direction of the external wound. The forceps may then be introduced along the finger; though M. Lisfranc recommends the introduction of a grooved conductor in the form of a blunt gorget. He directs it to be passed with its convexity upwards, and when in the bladder to be reversed, and the forceps introduced along its concavity: it is then to be withdrawn in the same manner as it entered, with its concave side downwards, and the stone felt for and extracted as before.

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### LATERAL OPERATION WITH THE GORGET.

The groove in the staff being opened, and the finger nail resting in it as in the former

operations, the operator takes the gorget in his right hand with its cutting edge directed obliquely downwards, and passes it along his finger till he fixes its beak in the groove of the staff; when he moves it backwards and forwards to ascertain whether it is securely fixed. Then rising he takes, as before, the handle of the staff in his left hand, and having brought it towards himself, pushes the gorget horizontally forwards in the direction of the bladder and so cuts through the prostate gland. The urine immediately flowing over the gorget, proves the entrance of the instrument into the bladder, when the staff is to be withdrawn. The forceps may be passed flatly along the surface of the gorget, which is then to be taken away, and the stone felt for and extracted as before.

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### OPERATION ABOVE THE PUBES, OR THE HIGH OPERATION.

This is the operation which it is supposed was performed by Colot, an Italian, in 1475



on a freebooter of Meudon in France, who was condemned to die for a robbery which he had committed; but it being discovered that he was afflicted with the stone, Louis the eleventh, at the request of some French surgeons, gave Colot permission, by way of experiment, to try the operation upon him, in the hope that it would be serviceable to others who suffered from the disease. It is related that the operation was performed in the church of St. Severin at Paris, with such success, that the patient was cured by the end of fifteen days; when he received a free pardon.

Pierre Franco is the first who wrote any account of the operation. He performed it in 1650 at Lausanne, on a child two years old; he had begun operating by the perinæum, but finding the stone too large to be extracted in that direction, and seeing that the distended bladder caused a prominence above the pubes, he performed the high

operation, and the child got well. In the last century it was frequently performed by Douglas, and Cheselden in England, and by Winslow, and Frere Come in France. Frere Come first made an incision by the perineum into the membranous part of the urethra, through which he passed the sonde a dard, and then opened the bladder above the pubes. In this way Sir Everard Home, about four years since, performed the operation at St. George's Hospital; but he now practises it without making any perineal opening. After this latter method Mr. Ewbank has also performed the operation at St. George's, for the history of which process I am obliged to my friend Mr. Chevalier Jun. who was present at the operation: and I also take this public opportunity of returning him my sincere thanks for the many other professional favours I have received through him. The following is the method in which the operation was performed.



The groins being shaved, the patient's back supported by pillows, and the thighs slightly elevated, an incision is made through the common integuments in the direction of the linea alba, and extending, in the adult, from about two inches above the symphysis pubis, nearly to the angle which the skin forms in mounting upon the penis. This is now continued deeper through the external fascia, and as near as may be, divides the bellies of the pyramidales muscles from each other. Some few fibres of these muscles, with the fascia beneath them, are now deprived of their insertion into the arch of the pubes by another incision close upon the bone at right angles to the former, and extending into that loose cellular membrane which lies between the abdominal parietes, the bladder, and the peritoneum reflected from the former to the latter. An incision may now be commenced from this last in the direction of the first, and the finger

of the operator being introduced between the peritoneum and the last mentioned fascia immediately covering this, is to be further divided as far upwards as may be necessary. If the bladder be very much distended, it is now laid bare: if not, the laxity of the cellular membrane which allowed this viscus when full to remove the peritoneum to a certain distance from the pubes, will now admit of the same distention by the hand of the surgeon. The sonde à dard (having previously received the proper curve, that is, a larger segment of a smaller circle than is usually given to the catheter) is now passed into the bladder, till its extremity is felt through the coats close to the symphysis pubis, when the stilet is pushed on into the external wound. The bladder, now trans-fixed by the stilet, and resting on the end of the sonde itself, is to be pushed up towards the navel, the whole sonde à dard being passed further through the urethra. The sur-



geon now having hold of the point of the protruded stilet, introduces in the groove on the lower or concave side thereof a probe pointed bistoury into the cavity of the bladder, the coats of which are thus divided downwards as far as the bone, when the finger immediately lays hold of them, and supports them against the lips of the wound, while the sonde á dard is withdrawn, and the other hand or the forceps removes the stone. When it is ascertained that the bladder contains no other calculus, an elastic gum catheter is passed by the urethra and fixed in the bladder. A small piece of dressing is placed on the wound so as to prevent any premature or inconvenient union in any part of it and the operation is concluded. The urine comes away chiefly through the catheter, which is allowed to remain till the state of the wound permits of its being permanently removed.

An Italian surgeon has recommended the

extraction of stones from the bladder by cutting into that viscus through the rectum. M. Dupuytren tried the operation at the Hotel Dieu but it did not succeed and therefore was not repeated. It is still, however, said to be practised successfully in Italy.

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### THE OPERATION ON THE FEMALE.

In the rare cases in which it is found requisite to perform the operation on the female, it is generally done in the following way.

The patient being securely bound, a straight conductor or staff is passed by the urethra into the bladder, with its groove directed obliquely downwards and outwards towards the patient's left side, the back or convex part being pressed upwards in an opposite direction, in order to enlarge the caliber of the urethra. The operator, holding the staff with his left hand, passes a probe-pointed bistoury along its groove, which cuts through the urethra and neck of the bladder in the first



named direction. He then withdraws the instruments and introduces his left index finger to feel for the stone, which having found, he passes the forceps, his finger serving as a director, and extracts as before.

M. Lisfranc recommends the incision through the urethra and neck of the bladder to be made upwards, inclining it slightly to either side to avoid the symphysis pubis. By making the cut in this way he says incontinence of urine is not so frequent a consequence of the operation as when the urethra is divided downwards and laterally. Should the opening be not sufficiently large to allow the stone to pass, he directs another incision to be made downwards, and a little inclined to one side, by which means the largest calculus, the pubes will admit, may be extracted.

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### CASTRATION.

This is said to be the most ancient of all operations. It is supposed first to have

been performed by the jealous polygamists of the east, who by it secured to themselves a set of individuals to whom they could without fear commit the care of their concubines : indeed it appears still to be practised for the same abominable purpose, as Captain Henry Light, of the Royal Artillery, who has published a history of his travels through Egypt, Nubia, and the Holy Land in 1814, relates that he saw two boats, containing one hundred and fifty black boys, on their way to Cairo, who had been totally emasculated, and cured in a month, at a village in the neighbourhood. They had been attended by a Franciscan monk ; who described the operation as easily performed and without much danger ; eleven only having died out of one hundred and sixty. They were intended for the Seraglio at Constantinople.

Celsus is the first who describes the operation as necessary for the removal of disease ; he points out three kinds of tumors which, in



order to be effectually cured, require the extirpation of the testicle.

When the operation is deemed requisite, but there is still an existing doubt as to the exact nature of the disease, it is recommended immediately previous to performing it, to make a small incision through the forepart of the scrotum into the tunica vaginalis; this caution is given to prevent the consternation and chagrin which surgeons are known to have experienced, who, having prescribed and commenced the operation, have suddenly ceased, when the flow of water or blood from the tunica vaginalis has proclaimed the disease to be either hydrocele or hæmatocele. The following is the general method of practising the operation.

The hair being shaved from the pubes, place the patient on a table of convenient height, and let his back be supported by pillows. Commence the first incision at the external abdominal ring, and continue it

down the front of the testicle to the posterior base of the tumor: if the skin be diseased, two elliptical incisions must be made and the diseased part removed. Having exposed the spermatic cord, and deprived it of its cellular connections, separate the artery and vein from the vas deferens at the upper part of the incision. By means of a curved needle pass a ligature round the two former and give it to an assistant to hold, to prevent them from being drawn within the ring by the action of the cremaster muscle, on the division of the cord. This caution being observed, cut through the whole of the cord about the third of an inch below the ligature; take hold of that portion attached to the testicle, and draw it forwards, when a few cuts with the scalpel through the loose cellular texture of the scrotum will remove the diseased part. The spermatic artery, the vessel which accompanies the vas deferens, and any others that bleed, are now to be separately



secured by ligatures, and the ligature of the cord is to be taken away. The edges of the wound should be approximated by two sutures, and straps of adhesive plaster applied.

M. Lisfranc, after the first incision, recommends the tumor to be dissected from below upwards which prevents the blood collecting before the point of the knife in the cellular texture of the scrotum. He secures the cord from slipping within the ring, by directing an assistant to place his index and middle fingers at a little distance from each other behind, and his thumb before it, opposed to the interspace; he thus presses it against each finger, which prevents the possibility of its being retracted; he then cuts through it, and ties such vessels as require ligatures.

Vincent Karm a German surgeon recommends the operation to be thus performed. An assistant with the fore-finger and thumb of one hand takes hold of the cord, with the integuments, above the part where it is to be

cut through, whilst with the other he separates the diseased from the healthy testicle. The operator then raises the one diseased, and by a single stroke of the knife cuts it away with its scrotal covering, beginning the incision at the raphe of the scrotum and cutting obliquely upwards and outwards. The arteries being taken up and the edges of the wound approximated, the operation is finished. This method has the advantage of being short; but as in many cases the testicle is too much enlarged to admit of being removed at one cut, and as the cord cannot be securely fixed by being pinched up within the integuments, the former must be considered the safest plan of performing the operation.

When the disease extends along the cord, it is cruel to submit the patient to the unnecessary pain of the operation: though M. Lisfranc says in cases of this kind he has seen M. Dubois pull down the cord and then divide it, and M. Dupuytren cut up the in-



guinal canal to the internal ring, and there cut through the cord; but in all the cases the patients have died.

Again, it is a matter of opinion whether it is not the better plan to secure the whole cord by ligature, and thus do away with the necessity of tying each vessel separately. M. Richerand practises the operation in this way; but cases are related in which a ligature including the whole cord, has produced such excessive pain and irritation as to necessitate its removal: the tying of nerves and veins too, has sometimes produced fatal consequences, therefore, the method of securing each vessel separately appears to be that which may be most safely pursued.

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### AMPUTATION OF THE PENIS.

Cancerous and malignant fungous affections are the diseases which give rise to the necessity for this operation; if the extent of the disease can be ascertained, it may be thus performed.

The patient rests on his back, while the operator, sitting by his left side, takes hold of that part of the penis which is to be removed, between the first two fingers and thumb of his left hand, and draws it slightly forwards, then with a straight bladed bistoury, or a catling, at one stroke, he cuts through the penis, about half an inch beyond the diseased part, directing his incision from below upwards. The bleeding arteries being secured by ligatures, an elastic gum catheter is to be introduced by the urethra and retained in the bladder; when dossils of dry lint should be applied to the surface of the wound.

The following appears to me the most simple and convenient method of retaining the catheter in the bladder on this, or any other occasion: it is the plan generally adopted in the French hospitals. A metallic ring, the circumference of which should be more than sufficient to encircle the penis, is to be



covered with cloth, and four long pieces of tape, with the same number of short ones attached to it. This, enclosing the penis, is fixed against the pubes by the long pieces of tape, which, surrounding the pelvis in different directions, meet and are tied posteriorly. One of the short pieces is carried through the ring, or round the groove of the catheter on each side, and being tied to its fellow, fixes the instrument securely in the bladder.

When the penis is to be amputated near the pubes, it is best to pass the catheter previous to commencing the operation, as the surrounding parts being more cellular, allow the blood to collect within them, which tends to obscure the orifice of the urethra, and renders the introduction afterwards much more difficult. In this case the incision must be made round the penis, as in amputating a limb; then by slitting up the urethra with a pair of scissars the separated part is removed from the catheter. The arteries being taken

up with a tenaculum and tied, dossils of lint are to be applied over the surface of the wound, and the whole is to be covered by pads of lint or soft cloth. The ring is to be fixed to the pubes over the dressings, and the catheter retained in the bladder as before.

## AMPUTATION OF THE EXTREMITIES.

Easy as the operation of amputation is acknowledged to be, we seldom see it performed in a masterly style; some parts being cut with which the knife has no business to come in contact, or others, which should be completely divided by that instrument, left partially separated, till the mangling teeth of the saw tear them assunder. As the course of the blood can be stopped by the application of the tourniquet, the operation holds out no immediate danger, and calls for but little knowledge of anatomy; any one may therefore undertake it, and by practising it a



few times on the dead subject manage to perform it with considerable dexterity. These remarks apply chiefly to the amputations of the leg, thigh, and arm; not to the partial amputations of the foot, nor to those between the articulations of bones, as at the different joints, which require a correct idea of the anatomical structure of the part, to enable the operator to perform them with skill.

Active and ingenious assistants are indispensable requisites to the well finishing of any of these operations: however dexterous the operator may be, he appears awkward if his assistants be not expert in the performance of their duty, to effect which judiciously requires more art than is necessary for merely cutting off the limb. Two assistants at least should be present; to the one belongs the business of properly sustaining and fixing that part of the extremity which is about to be removed, so that it shall neither excite action in any of the muscles which

are to be divided, by calling on them for support, nor by an unequal bearing, offer an impediment to the progress of the saw, during the operation of cutting through the bone. To the other devolves the duty of retracting the integuments, and shielding the muscles from the teeth of the saw, as well as presiding over the tourniquet, relaxing or tightening it as the operator may direct.

In all the amputation at joints it has been thought proper to cut off the whole surface of the cartilage exposed; with a view to prevent any impediment to the process of union by a secretion of synovia in the wound.

I shall now proceed to describe separately and successively each amputation, commencing with those, which, though of least consequence to the patient, will not be considered by the operator as unworthy of particular attention.



AMPUTATION OF THE SECOND, OR  
THIRD PHALANX OF A FINGER.

With us this operation is generally performed by making a circular incision round the finger, about a quarter of an inch nearer its extremity than the joint at which you are about to amputate; then an incision on each side extending back from the first to the joint, so as to form two flaps, which are to be dissected back and the tendons with the lateral and capsular ligaments cut through, which finishes the operation.

The following is the process adopted by M. Lisfranc, certainly more expeditious than the former; but as it leaves only a single flap, it is not probable that the wound will heal so readily by adhesion as when the operation is performed in the manner already described; yet a case may possibly occur, in which the one operation could be performed, and the other not be practicable.

The hand being prone is fixed by an assis-

tant, who bends the other fingers and separates them from the one to be operated on. The operator with the fore-finger and thumb of his left hand, takes hold of the phalanx to be amputated, placing his thumb on its dorsal, and his finger on its palmar surface, and having half bent it, observes the situation of the small fissure in the integuments on the side of the bone, caused by that position; immediately before which the joint will be found. At this point, with a straight bladed bistoury, he makes his incision, and at one sweep lays open the joint by cutting through the integuments and ligaments on the sides and dorsum of the finger, from left to right. In cutting the ligaments at the sides, the edge of the bistoury is directed obliquely towards himself, and those on the dorsum in the opposite direction. The phalanx is now to be held by its sides, and the ligament at the under part cut through, the bistoury is then placed horizontally with regard to the



phalanx, and a flap of sufficient length formed from its palmar surface by cutting between the integuments and bone.

In cases where the finger is so much swollen as to render demiflexion difficult and painful, M. Lisfranc recommends the operation to be reversed, and performed thus.

The hand being supine and fixed by an assistant, the operator extends the diseased finger, and bends the others, that they may be out of the way of the knife. He then takes hold of the phalanx with his left hand, placing his thumb on the palmar, and forefinger on the dorsal side, while with his other fingers, he forms a support for the bistoury; which is to be introduced horizontally immediately anterior to the fissure, in a line with the joint, and pushed through beneath the integuments, to the opposite side, the point being directed obliquely upwards to avoid the bone, when a flap is to be formed by cutting forwards and outwards. This being done and

held back by the assistant, the heel of the bistoury is applied to the base of the flap; when, by drawing it from left to right, the joint is cut through, which removes the phalanx. In operating in this way at the second phalanx, the point of the bistoury should be passed immediately under the fissure formed in the integuments on the palmar surface. No ligature will be required for the divided vessels; pinching their bleeding extremities with the forceps being sufficient to stop the hæmorrhage.

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### AMPUTATION OF A FINGER AT ITS FIRST PHALANX OR JUNCTION WITH THE METACARPAL BONE.

Put the hand prone, feel for the joint, and slightly bend the finger: then place the thumb of your left hand on its dorsal aspect, the fore finger on its palmar surface. With the heel of the bistoury begin the incision about the middle of the head of the metacar-



pal bone, or knuckle; cut almost parallel to the bone of the finger, lowering your hand till the knife is perpendicular, then cut directly from you till you are opposite the joint, towards which turn the edge of the bistoury; cut through it, and pass the knife between the integuments and bone on the opposite side, where form a corresponding flap by cutting towards yourself. For obvious reasons never begin with the point of the knife, or raise your hand during the operation.

If the finger be amputated for accident, no ligature will be required; but if for a disease in which there has been long continued inflammation, the arteries should be secured, as they are generally enlarged. The edges of the wound are brought in contact by approximating the other fingers, and binding them together with tape, if the one removed be either the ring, or middle finger. On either of these fingers this operation should

be preferred to the amputation of the second phalanx, as the remaining stump, or first phalanx, in that case is not only useless but a deformity; whereas after this operation the loss of the finger can be scarcely perceived by a superficial observer.

The same operation does for the toes; with this difference, that you begin with the point of the bistoury and cut parallel with the bone, till you arrive opposite the joint which in them is very deep.

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### AMPUTATION OF THE METACARPAL BONE OF THE THUMB.

When it is the right metacarpal bone to be removed, the hand is to be placed supine and vice versa.

The hand being held firm by an assistant, the operator separates the thumb from the index finger, and applies the heel of his bistoury to the middle of the space between them. Then, keeping the point perpendicu-



larly upwards, he cuts forwards between the metacarpal bones of the thumb and fore finger; till his knife striking against the trapezium he knows it to be opposite the joint, towards which he turns the point of his bistoury, and cutting through the capsular ligament opens the joint. He now glides his knife through the joint, at the same time pressing the head of the bone towards the hand, and forms a flap from the side of the bone by cutting towards himself. The proper extent of the flap may be known by approximating the thumb to the index finger one or more times as required.

It has been recommended to perform the operation in the following way. Feel for the styloid process of the radius, an inch before which you find the joint: thrust your knife into it, and cut inwards till you have cleared it; then cut along the middle space between the thumb and index finger, thrust the head of the bone inwards, and form a flap from the side of the bone as before.

In this manner the joint is not so readily opened as in the former: the point of the knife is also in danger of being broken, when thrust into the joint as last directed.

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### AMPUTATION OF THE METACARPAL BONE OF THE LITTLE FINGER.

An assistant keeping the hand prone, fixes it securely. The operator, with the fingers of his left hand, draws the muscles situated on the side of the bone towards the palm, and with his right index finger feels along the bone till he finds its carpal head, on which he places his left thumb. Now raising his fingers, he allows the muscles to return to their natural situation, and applies his left index finger beneath upon the point opposed to his thumb, and squeezes the muscles outwards. Holding the bistoury perpendicularly as a pen, he thrusts it from above downwards, completely through the integuments, and muscles opposite the joint, and close to



the bone, along which he continues his incision till he comes to its other extremity, where he cuts out. The flap thus formed being held aside by the assistant, the operator dissects back the integuments from the dorsum of the bone, leaving the tendon: having finished which, he cuts into the side of the joint in an oblique direction towards the thumb. He then thrusts the knife from above downwards, between the fourth and fifth metacarpal bones, taking care to avoid puncturing the integuments on the palmar side, and separates the two bones from each other by cutting out towards himself. Now, drawing the bone apart from its fellow, he divides the uncut ligaments, dorsal and lateral; and finishes the operation by turning the edge of his knife upwards, and cutting through the palmar muscles and ligaments.

After both these last operations the bleeding vessels are to be taken up with a tenaculum and secured, and the divided surfaces kept in contact by adhesive plaster.



## AMPUTATION AT THE WRIST JOINT.

The tourniquet being applied to the lower part of the upper arm, the forearm is held by an assistant in a state between pronation and supination; while the operator with his left hand takes hold of the hand to be amputated, and fixes it by placing his thumb on its palmar, and fingers on its dorsal surface; if it be the right hand, and vice versa. Then with the thumb of his right hand, he feels for the styloid process of the radius, an inch before which, at the root of the thumb, he commences his incision. From this point, with a catling or small amputating knife, he makes a circular cut through the integuments round the wrist. The assistant drawing the integuments upwards, the operator dissects them back as far as the styloid process; when, directing the edge of his knife obliquely towards the radius, he opens the joint by cutting through the ligament passing from the styloid process to the scaphoid bone.



Bearing the hand slightly downwards he continues his incision through the joint, at the same time cutting the tendons on both sides as close to the radius as possible, till the hand is removed; the assistant shielding the reflected integuments from the edge of the knife by holding them back. The operation when performed in this way leaves an excellent stump.

The following is M. Lisfranc's method.

The tourniquet being applied and the forearm fixed by an assistant with the hand prone; the operator places his two index fingers above the joint, one on the radius, the other on the ulna. He then bends and extends the hand, whilst doing which he draws his fingers down the bones till he feels the styloid process of the radius, on the extremity of which he places the fore finger of his left hand, and his thumb on the corresponding point of the ulna, if it be the right hand to be removed, and the reverse if it be

the left. With a catling he makes a semilunar incision through the integuments, with its convexity towards the hand, beginning at the point before the thumb, and ending at the opposite one. Then, directing the point of his knife obliquely downwards, he cuts through the ligaments on the ulnar side, and by depressing the handle continues his incision through the tendons and ligaments on the dorsum, to the styloid process, at the same time bending the hand so as to expose the articulatory surface of the bones of the wrist. Having glided his knife through the joint, and divided the capsular ligament, and tendons below, he forms a flap of the integuments, of sufficient length to cover the stump, from the palmar surface, by cutting towards himself, taking care to avoid the pisiform bone.

This latter operation may be reversed and performed thus. Having found the extremities of the radius and ulna as before, place the forearm in a state between pronation and



supination, and thrust the point of the catling beneath the integuments from the anterior and inner edge of the ulna, till it appears just before the styloid process of the radius, and form a sufficient flap by cutting towards the palm. Then cut through the integuments and tendons on the dorsal side, and finish the operation by cutting through the joint, from before the styloid process of the radius downwards.

Three arteries generally require to be secured after this operation: the radial, the ulnar, and the interosseal. The cut surfaces are to be approximated by adhesive plaster and the arm kept in a sling.

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### AMPUTATION OF THE LOWER THIRD OF THE FOREARM, WITH TWO FLAPS.

The tourniquet being applied as before, and the upper part of the forearm fixed by an assistant, the hand being in a middle state

between pronation and supination, the operator stands on the inner side of the arm. Holding the part to be removed between the thumb and palm of his left hand, he thrusts the catling beneath the integuments from below upwards, pushing it in at the anterior and inner edge of the ulna close to the bone, and thrusting it on till it appears at a corresponding point on the outer edge of the radius, when he forms a flap half an inch or more in length, by cutting towards the wrist. He then passes the instrument under the integuments, behind the bones, from the point where it came out before the radius, to that on the inner edge of the ulna where it was first introduced, and forms a flap posteriorly of the same length as the former. These being held back by the assistant, the operator introduces the point of his knife between the bones from the anterior side; divides the muscular fibres and interosseous ligament, and draws it out by cutting round the ulna.



He again passes it between the bones from the posterior surface, and withdraws it in a similar manner by cutting round the radius. By this figure-of-eight-like incision he cuts through all the muscular fibres, interosseous ligament and periosteum, on, and between, both bones; then, putting the arm in a state of pronation, he saws through the radius and ulna. As the radius at this part is rather larger than the ulna it should be sawed through first, the latter bone, from its connection with the humerus, being better adapted to bear the weight of the saw.

In using the saw, the operator marks with his left thumb the point at which the bone is to be sawed through; this not only serves as a guide to the instrument, but, with the fingers of the same hand, assists in keeping the bone steady. Then by slight motions of the saw, he forms a small channel in the bone; having done which, he gives a greater degree of mobility to the instrument, drawing it from

heel to point, and vice versa, till the bone is sawed through. In doing this he makes no pressure on the saw, he merely puts it in motion; its own gravity being sufficient to enable it to make its way.

Four arteries generally require ligatures, the radial, the ulnar, and the two interosseal. The cut surfaces are kept in contact as before.

In performing this amputation on the left arm, the operator begins by thrusting the knife from above downwards anteriorly, that is from the radius to the ulna; and the reverse posteriorly.

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### AMPUTATION AT THE MIDDLE OF THE FOREARM.

The tourniquet being applied to the lower part of the upper-arm, the forearm is fixed by two assistants in a middle state between pronation and supination; one supporting the bones at the elbow, the other at the wrist.



The operator, standing on the inner side of the extremity, makes, with a catling, a circular incision through the integuments round the limb, and then dissects them back for one inch and a half, more or less, according to the muscularity of the subject, the assistant who supports the elbow at the same time drawing them upwards. Then holding them back, out of the way of the knife; the operator makes another circular incision round the limb, applying the catling close to the base of the reflected integuments, and cutting through the fascia, and muscles down to the bones. He then passes the catling between the bones and cuts through the remaining muscular fibres, interosseous ligament and periosteum, by the figure-of-eight-like incision as in the last operation, Having ascertained by passing his finger round the bones that they are denuded at the part to be sawed through, and that the soft parts are all cut, he places the hand prone, and saws through

both bones at the same time, the assistant carefully retracting the muscles and integuments so as to leave the course of the saw clear. The same vessels require ligatures as in the last operation.

The flap operation as last described may be performed at this part; and this at the lower third of the forearm: they may also be performed nearer to the elbow joint.

### AMPUTATION AT THE ELBOW JOINT.

Though the stump after this operation is not more useful than when the amputation is performed at the lower part of the humerus, and though the healing process is longer protracted, and attended with greater risk to the patient, yet it has been performed by M. Dupuytren in Paris. M. Lisfranc relates that in one case of which he was a witness, the wound was several months before it was completely healed.



The following is the method of operating adopted by M. Dupuytren.

The brachial artery being compressed by the tourniquet, and the extremity fixed by assistants above and below the elbow: the operator thrusts a catling beneath the integuments and muscles of the forearm just below the condyles of the humerus, at the bend of the elbow, and forms a flap three inches in length by cutting towards the hand. This flap being held back, he cuts through the integuments and muscles on the posterior side of the arm, by an incision level with the extremity of the olecranon. Then feeling with his left thumb for the head of the radius, he separates it from the humerus by directing his knife obliquely between the two bones, and removes the ulna by cutting round its sigmoid cavity, taking away as much of the capsular ligament as possible. The bleeding vessels being tied, the condyles of the humerus are covered by the flap, the edges of the wound

approximated by adhesive plaster, and a bandage applied.

### AMPUTATION AT THE MIDDLE, OR AT THE LOWER PART OF THE HUMERUS.

The patient being seated on a low chair, the brachial artery is to be compressed by the tourniquet at the upper part of the arm, the extremity raised from the side, and fixed horizontally by two assistants, one supporting it at the upper part, the other at the elbow.

The operator places himself on the outer side of the limb, kneels on his right knee, keeping his left bent in advance. Resting in this position, he holds the amputating knife above the arm, its point being directed towards the tip of his right shoulder, and, while the assistant keeps the skin tense by drawing it upwards, he cuts through the integuments, gradually raising himself as he continues



the incision, till he has formed a circle round the limb. He then dissects back the skin for an inch or more as may be required, and whilst the assistant keeps it reflected, he stoops as before, and, level with its base, makes a circular cut through all the muscles down to the bone. He again applies the knife to the deeper seated muscles, and directing its edge obliquely up the limb, he makes another circular incision so as to expose the bone a little higher up, to which part, the periosteum being cut through, and the muscles and integuments held carefully back, the saw is applied, and the bone sawed through. The brachial artery, the deep humeral and others, if requisite, are secured by ligatures; the edges of the wound approximated, and a roller applied.

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### AMPUTATION AT THE SHOULDER JOINT.

The subclavian artery being pressed by an assistant on the first rib from above the

clavicle, so as to interrupt the circulation in the extremity; another assistant supports the arm in an horizontal position.

The operator, with a bistoury or scalpel, makes an incision through the integuments along the inner border of the deltoid muscle, extending from its upper part nearly to its insertion; then a corresponding one on its outer border. These two he connects by a third of a semilunar form, with its convexity downwards, passing across the muscle, just above its insertion, from the lower extremity of the first incision to that of the second, and cutting through the integuments and muscle down to the bone. He then dissects back the muscle, an assistant keeping it reflected, he lowers the arm, and with a catling or small amputating knife, opens the joint at its upper surface by cutting through the capsular ligament and tendon of the biceps. Then, cutting round the articulatory surface of the head of the bone, he removes the extremity



by dividing the remaining ligament, muscles, and integuments; cutting last through that part where the axillary artery is situated as he finishes his incision. The axillary artery is immediately seized and tied, and such of the circumflex and others secured as require ligatures; the glenoid cavity is covered by the flap, and the edges of the wound kept in contact by adhesive plaster.

Baron Larrey, during his military campaigns, remarked that after the operation when thus performed, the healing process was long protracted owing to the small number of vessels which the flap received for its nutriment; and that sinuses often formed. He also observed that those cases healed sooner where no flap was saved, than where a single one was only preserved; he therefore, with a slight variation, adopted Desault's plan of making two flaps, and states that out of an hundred and odd cases in which the operation was performed, more than ninety recovered. The

following is the method in which the Baron at present performs the operation.

The patient being seated on a low chair, an assistant presses the subclavian artery on the first rib, another assistant fixing the arm at the elbow, and raising it a little from the side. The operator thrusts a long catling through the integuments and deltoid muscle, immediately below the acromion process, till it strikes on the head of the humerus, on the posterior side of which he makes it pass, drawing the arm slightly forwards, and pushing the catling onwards till it appears in the axilla opposite to the point at which it was introduced. He then forms the posterior flap by cutting downwards and outwards, separating half of the deltoid muscle and the latissimus dorsi from the humerus. He again introduces the catling at the same place, and drawing back the arm, pushes it onwards till it appears at the former point in the axilla, but in this instance passing it on the anterior side of the bone.



He then forms the anterior flap, corresponding at every point to the posterior, dividing the artery as the knife cuts out. The flaps being held back, he divides the tendon of the biceps at the superior part of the glenoid cavity, raises the arm, and finishes the operation by cutting through the remaining adhesions. The vessels being tied, the cut surfaces are kept in contact by adhesive plaster.

During the operation the artery may be compressed between the fingers and thumb of an assistant, when the knife has formed the second flap; but where it can be pressed securely on the first rib, less blood is lost, and the fingers of the assistant are out of the way of the operator.

M. Lisfranc recommends the following method, which, if dexterously executed, is certainly the most expeditious; it however requires considerable practice to accomplish it skilfully.

Supposing the left extremity is to be

removed; the patient is placed on an elevated seat, one assistant pressing the artery above the clavicle on the first rib, whilst another draws the arm forwards. The operator standing behind the patient, with a long bladed catling, pierces the integuments on the inner edge of the latissimus dorsi muscle, opposite the middle of the axilla, and pushes it obliquely upwards and forwards, till its point strikes against the under surface of the acromion; then by raising the handle of the knife its point is lowered, and protruded just before the clavicle, at the part where it joins the acromion. He then, by cutting downwards and outwards, forms a flap from the superior and posterior part of the arm, including the whole breadth of the deltoid muscle, and a part of the latissimus dorsi. This being held back by the assistant, the joint is cut through by passing the knife between its articulatory surfaces from behind forwards, and a corresponding flap is formed by cutting downwards and outwards between



the muscles and bone on the inner side of the arm. The vessels being tied, and the flaps placed in contact with each other, the operation is finished.

In operating on the right side, the patient should be seated on a low chair, and the catling thrust from above downwards, introducing it just before the point where the clavicle is connected to the acromion, and raising the hand as it is thrust backwards and downwards, till it appears on the inner edge of the latissimus dorsi, when the flap is to be formed, and the operation continued as before.

M. Richerand observes "by this method a dexterous operator can separate the arm from the trunk as quickly as an expert carver detaches the wing of a partridge."

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### AMPUTATION OF THE TOES.

Accidental causes, or mortification produced by exposure to cold, may give rise to

the necessity of removing the toes. In either of these cases, to remove each toe separately, would be a more tedious and painful process than is requisite. M. Lisfranc has therefore proposed the following method.

Supposing it the left extremity to be operated on, and the foot steadily fixed by an assistant, the operator feels for the head of the first phalanx of the great toe, which joins the metatarsal bone, and on it places his left thumb; on the same extremity of the little toe, he places his left index finger, the toes resting in the palm of his hand. He then, with a narrow bladed catling, or amputating knife, makes a semicircular incision from the point marked by his thumb, to that before his index finger, cutting through the integuments and tendons. By a second cut in the same direction, he opens the joints, and, bending the toes downwards, cuts through the ligaments surrounding the articulations. Keeping the toes still bent, he



passes the knife horizontally a little way beneath the under surface of the bones, so as to get clear of the articulations. Then, raising the toes and pressing them upwards, he lowers the handle of his knife, and, with the point, completes the flap from their under surface, by cutting to the commissure of each separately, beginning at the great toe; the assistant raising them in regular order as the knife cuts through the integuments below. In this way a flap is formed of sufficient size to cover the heads of the metatarsal bones, and unite with the divided integuments above. The arteries which require ligatures being tied, the cut edges are to be kept in contact by adhesive plaster.

In performing the operation on the right foot, the first incision is made from the little toe inwards, and finished in the same manner, the operator cutting from left to right.

In cases in which it is requisite to remove all the fingers, the operation is to be performed in a similar way; keeping in mind that the

first incision, instead of being semicircular, is to be oblique.

### AMPUTATION OF A PART OF THE METATARSAL BONE OF THE GREAT TOE.

This operation is required when a portion of the bone becomes carious. If the extent of the caries can be ascertained, M. Lisfranc performs the operation in the following manner.

The foot resting on a table, and being fixed by an assistant, the operator, with his thumb on the dorsal surface, and fingers on the plantar, presses the integuments and muscles to the side of the bone, opposite the part where it is to be sawed through. Retaining them in that situation by the fingers and thumb of his left hand, he thrusts a straight bladed bistoury through them, from above downwards, close to the bone, and forms a flap by cutting along its side till he has



passed the joint which connects it to the toe. From the base of the flap, which is held back by the assistant, he makes another incision obliquely across the bone, and continues it between the first two bones so as to separate them from each other; he then divides the remaining integuments and muscles on the sole by a circular cut, applies a retractor, and saws through the bone, in an oblique direction, from the base of the flap towards the extremity of the little toe.

The digital branches of the inner plantar artery being secured, if ligatures are required, the flap is kept in contact with the cut surface by adhesive plaster.

A similar operation may be performed on the metatarsal bone which supports the little toe.

The late Mr. Hey, in his *Practical Observations in Surgery*, speaking of caries of the metatarsal bones, says: "When the caries has being confined to the metatarsal bone of

the great toe, it has been usual I believe, after making a longitudinal and transverse incision, to saw off that part of the bone which has been found carious. But as it is sometimes difficult to ascertain the extent of the caries, I think it is a more advantageous method of operating, to dissect out the whole of the metatarsal bone at its junction with the cuneiforme bone. I have done this after a simple incision through the soft parts; but now prefer the removal of a portion of the integuments, in a longitudinal direction, as they are usually in a thickened state, and leave a large cavity which rather prevents the speedy healing of the wound."

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**PARTIAL**

**AMPUTATION OF THE FOOT AT THE  
JUNCTION OF THE TARSALE  
WITH THE METATARSAL BONES.**

The late Mr. Hey, in the work last quoted, relating the case of Mary Stanfield, whose



metatarsal bones were carious, gives the following as the method he adopted in performing this operation.

“I made a mark across the upper part of the foot to point out as exactly as I could the place where the metatarsal bones were joined to those of the tarsus. About half an inch from this mark, nearer the toes, I made a transverse incision through the integuments and muscles covering the metatarsal bones. From each extremity of this wound, I made an incision along the inner and outer side of the foot to the toes. I removed all the toes at their junction with the metatarsal bones, and then separated the integuments and muscles, forming the sole of the foot, from the inferior part of the metatarsal bones ; keeping the edge of my scalpel as near to the edge of the bones as I could that I might both expedite the operation, and preserve as much muscular flesh in the flap as possible. I then separated with the scalpel the four smaller metatar-

sal bones, at their junction with the tarsus ; which was easily effected, as the joints lie in a straight line across the foot. The projecting part of the first cuneiforme bone, which supports the great toe I was obliged to divide with the saw. The arteries which required a ligature being tied, I applied the flap, which had formed the sole of the foot, to the integuments which remained on the upper part; and retained them in contact by sutures. A very speedy union of the parts took place, and the wound was healed, except a very small superficial sore at the expiration of a fortnight."

M. Lisfranc performs this operation without leaving any of the integument which is situated on the upper part of the metatarsal bones: he adopts the following process.

The tourniquet being applied to the femoral artery, just before the part where that vessel passes through the tendon of the triceps muscle, the heel is supported, and



the foot securely fixed by an assistant. The operator passes the index finger of his left hand along the metatarsal bone of the little toe, till he feels its tuberosity joining the os cuboides, on which he places his left thumb. In like manner he carries the fore-finger of his right hand along the metatarsal bone which supports the great toe, till he finds its head, where he places his left index finger, and grasps the sole of the foot firmly in the palm of his hand. He now, with a narrow bladed amputating knife, makes a semilunar incision, with its convex edge towards the toes, through the integuments and tendons, beginning about half an inch before, and a little below the point marked by his thumb on the outer side of the foot, and continuing across its dorsum to about two lines, or one sixth of an inch, before his index finger. Keeping the foot firmly grasped in the palm of his hand, with the point of his knife he cuts through the ligaments connecting the fifth

metatarsal to the cuboid bone, in an oblique direction, which, if continued, would pass through the head of the first metatarsal bone. Having cut the ligaments, which join the two next metatarsal to the cuneiforme bones, less obliquely, he commences on the inner side of the foot by cutting the ligaments, which connect the first metatarsal to the first cuneiforme bone. Then turning the point of his knife obliquely downwards and from him, the handle being above and towards him, and using considerable force, he cuts through the ligament connecting the second metatarsal to the side of the first cuneiforme bone : in doing this, his knife passes between the two bones, its handle describing the arch of a circle from him. With the point of his knife, he now cuts through the ligament connecting the upper part of the second metatarsal to the second cuneiforme bone, bending all the metatarsal bones downwards to lay open the articulations, when he divides the ligaments



on the under surface, by cutting obliquely across them. Having separated the metatarsal from the tarsal bones, he glides his knife between the former and the muscles of the sole of the foot, and forms a flap, of sufficient length, by cutting towards the toes. The arteries being tied, the edges of the flap are to be kept in contact with the integuments on the upper part of the foot, by sutures, or adhesive plaster.

In performing the operation on the left extremity, the operator commences on the inner side of the foot, making his first incision from the great toe outwards.

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#### AMPUTATION AT THE ARTICULATION OF THE ASTRAGALUS AND OS CALCIS, WITH THE SCAPHOID AND CUBOID BONES.

M. Chopart was the first who amputated at this part, it is therefore called Chopart's operation.

The articulation is readily found, by tracing with the index finger from the inner malleolus, forwards and downwards, till the projecting part of the scaphoid bone is felt, which marks the situation of the joint on the inner side of the foot. On the outer side, it is found an inch from the tarsal head of the metatarsal bone, which supports the little toe. These two opposed points being marked, one by the thumb of the left hand, and the other by the index finger, while the sole of the foot is grasped firmly in the palm, and the leg steadily fixed by an assistant: the operator, with a narrow bladed amputating knife, makes a semilunar incision through the integuments and tendons, extending from the point before his thumb, across the dorsum of the foot, to that before his index finger. Then, bending the foot, he opens the joint by dividing the ligament which connects the Astragalus to the Scaphoid bone. He cuts



through the strong ligaments which join the Calcis to the Cuboid with the point of his knife, holding it perpendicular, cutting transversely, and bending the part to be removed farther downwards. Having cut through the articulation, he forms a flap of sufficient length to cover the stump from the sole of the foot, by cutting towards the toes, between the muscles and metatarsal bones. The bleeding arteries being tied, the edges of the flap are to be kept in contact with the integuments surrounding the dorsum of the foot by straps of adhesive plaster or sutures.

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#### AMPUTATION A LITTLE BELOW THE MIDDLE OF THE LEG, WITH A FLAP.

The femoral artery being compressed by the tourniquet, the limb is raised and supported by two assistants, one fixing the foot, the other the leg, at its upper part. The operator standing on the inner side of the

limb, places the thumb of his left hand on the inner border of the tibia, and his fingers on the fibula; and with a catling makes an incision through the integuments, across the fore part of the leg, extending, from the outer edge of the fibula, to the inner of the tibia. He then pushes the catling behind and close to the bones, from the inner to the outer extremity of this incision, and forms a flap of sufficient length, by cutting down the leg. This being held back by the assistant, the operator places the edge of his knife on the posterior surface of the fibula, and cuts across it till the point of his instrument reaches the interosseal space, through which he pushes it and cuts through the muscles and ligament situated between the bones. Without raising the knife from the tibia, he draws it round that bone, cutting through the muscular fibres and periosteum, till he comes to its anterior border; where he again passes it between the bones, from above downwards,



cuts through such fibres as were not before divided, and withdraws the instrument by cutting to the posterior and outer edge of the fibula. Having ascertained that the bones are properly denuded, by passing his finger round them, he applies the saw; saws through one third of the substance of the tibia, and then cuts both bones at the same time. The anterior and posterior tibial, and the peroneal arteries being secured, the cut surface of the bones is covered by the flap, and the edges of the wound approximated by straps of adhesive plaster.

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#### AMPUTATION BELOW THE KNEE.

The tourniquet is applied, and the extremity fixed by two assistants, as in the last operation. The operator rests on his right knee, on the inner side of the limb; and with a catling or an amputating knife, makes a circular incision round the leg through the integuments, six inches below the point of

the patella, rising from the ground as he finishes the incision. The assistant now draws the integuments upwards, while the operator reflects them back for two inches, or more, according to the muscularity of the subject, by cutting through the cellular tissue which connects them to the fascia below: then kneeling as before, he makes another circular incision, level with the base of the reflected skin, through the fascia and muscles down to the bones. He passes the catling through the interosseal space, draws it round the tibia, and fibula, as in the last operation; and removes the leg, by sawing through both bones at the same time. Ligatures being applied to the bleeding vessels, the lips of the wound are to be kept in contact by adhesive plaster; the line of union extending from above downwards.

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### REMOVAL OF THE KNEE-JOINT.

Mr. Park of Liverpool performed this operation twice. One of his patients after lin-



gering four months died; the other, who was a robust sailor, after many months confinement, recovered. Should the operation be successful, the limb would be but little better than a wooden leg; while the situation in which the patient would remain during the tedious and protracted cure, would be infinitely more hazardous than that after the operation of amputation above the knee.

It may be practised in the following manner, on the dead subject, for on the living I should scarcely believe it would ever again be attempted.

An assistant raising the thigh fixes it securely, while the operator half bends the leg; and, with a small amputating knife, makes a semilunar incision through the integuments, extending from the side of the outer condyle of the femur, below the apex of the patella, to an opposite point on the inner condyle, if it be the right leg, and the reverse, if it be the left. He then makes a correspond-

ing cut, beginning and terminating at the same points as the former, but passing above the patella. Now, cutting across the joint below the patella in the course of the first incision, he exposes the articular surfaces of the bones, and divides the crucial ligaments with the point of his knife, taking care not to touch the popliteal artery. These being divided, the assistant raises the thigh nearer the body; while the operator presses the leg backwards against it, and cuts round the posterior part of the femur just above the condyles, so as to denude the bone at that part; still having a watchful eye to the popliteal artery. The muscular and tendinous structure, on the anterior and lateral parts of the bone, is now to be cut in the direction of the incision, passing above the patella; and the bone, being denuded, is to be sawed through immediately above its condyles. The lower part of the femur and the patella being taken away, the upper part of the tibia



is to be carefully laid bare, just below its articular surface, by cutting round the bone: its cartilaginous surface is then to be sawed off, beginning at the posterior part of the joint and sawing forwards, the leg being still bent on the thigh, and both securely fixed by assistants. The upper extremity of the tibia may then be brought in contact with the lower end of the femur, and the edges of the wound approximated.

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### AMPUTATION OF THE LOWER THIRD OF THE THIGH.

The patient should be seated on a table of convenient height, his back supported by pillows, the tourniquet applied as high up the limb as possible, or the artery pressed against the pubes, where it passes over that bone; and the extremity fixed by two assistants, one supporting the thigh, the other the leg. The operator, placing himself on the outer side of the limb, and kneeling on his

right knee, with a full-sized amputating knife, makes a circular incision through the integuments round the thigh, about two inches above the patella in the same manner as directed in the amputation at the lower part of the humerus.

He then dissects back the skin for about three inches, by cutting through the cellular texture which connects it to the fascia and muscles beneath; and while the assistant keeps it reflected, he makes another circular incision close to its base, through the more superficial muscles; the deeper seated he cuts through by a third incision, a little higher up the limb, which lays bare the bone at the part where it is to be sawed through. A linen retractor is now applied, and held by the assistant, to shield the divided muscles from the teeth of the saw, while the operator saws through the bone. The femoral artery, and others that bleed, being secured, the lips of the wound are to be kept in contact by straps of adhesive plaster, and a roller applied.



**AMPUTATION AT THE MIDDLE OF THE THIGH, WITH TWO FLAPS.**

The extremity should be fixed by two assistants as in the last operation, while a third presses on the artery in the groin so as to interrupt the circulation. The operator, standing on the outer side of the limb, makes the inner flap first by thrusting a long bladed catling from the middle of the anterior, to the posterior surface of the thigh, passing it on the inner side of the femur close to the bone; and forms the flap, from two or three inches in length, by cutting out obliquely.

The femoral artery, divided by this incision, is instantly to be secured. The operator then forms the outer flap, of the same length and shape as the other, by passing the knife in and out at the same points as before, but carrying it on the outer side of the bone.

The undivided muscular fibres attached to the bone are divided by a circular incision close to the base of the flaps, the edge of

the knife being directed obliquely towards the trunk, while the flaps are held back by the assistant. The bone is then to be sawed through, observing that the muscles are protected from the teeth of the instrument either by a retractor, or the fingers of an assistant. Any other vessels which require ligatures being taken up with a tenaculum, and secured, the flaps are to be placed in contact with each other; and so retained by straps of adhesive plaster and a roller.

I have heard it stated by a German surgeon, who had seen the practice, that Dr. Rock, Professor of clinical surgery at the hospital of Munich in Bavaria, after performing this operation, approximates the flaps without securing any vessel; as he finds keeping the cut surfaces in perfect coaptation sufficient to prevent after bleeding.

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## AMPUTATION AT THE HIP-JOINT.

Baron Larrey in the history of his military campaigns, mentions eight cases in which he



performed this operation; out of the number two recovered; a third lived for a month, at which time the wound was nearly healed, when, owing to the scarcity and badness of provisions, which consisted of unripe fruits, bad potatoes, and sour beer, he, with many other wounded, died of dysentery. The operation has also been performed by British military surgeons during the late wars. On the dead subject, I have seen M. Lisfranc perform it with amazing dexterity, executing it in less than ten seconds. He adopts the following process.

The nates of the patient resting on the edge of the table, and the extremity being supported by an assistant; the operator draws a line, an inch in length, from the anterior and superior spinous process of the ilium, straight down the thigh. From this point he marks another inwards towards the pubes, of half an inch, so as to form a right angle. On the inner extremity of the last, he places

the point of a long bladed catling, and pushes it perpendicularly downwards, till it strikes against the head of the femur: then, passing it on the outer side of the bone, he thrusts it onwards, till it protrudes at about an inch from the margin of the anus. He now cuts outwards, for near an inch, in order to get clear of the great trochanter, and forms the external flap, four or five inches in length, by cutting down the limb between the muscles and bone. The femoral artery, which may now be seen, is to be compressed between the fingers and thumb of an assistant; while the operator thrusts the knife in and out, at the same points as before; but carrying it on the inner side of the head of the bone, he forms a smaller flap on that side of the extremity. He then, with the point of his knife, cuts through the capsular ligament surrounding the head of the femur, dislocates the bone, and removes the limb by dividing the round ligament, and the remain-



ing adhesions. The blood vessels being secured, and the flaps approximated, the operation is concluded.

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### FISTULA LACHRYMALIS.

A narrow straight bladed bistoury with a groove near its back will be found the best instrument for opening the duct, and affording a ready passage for the probe or style. The situation of the lachrymal sac may be discovered, and the operation practised in the following manner.

The patient being seated, and his head fixed upright by an assistant; the operator places the fore-finger of his left hand on the outer angle of the orbit, and stretches the integuments by drawing them outwards. Then, with the same finger of his right hand, he traces along the inferior border of the orbit, till he arrives near the inner angle, where he finds the sac situated behind the tendon of the orbicularis muscle, just within

the orbital margin. Marking this spot and holding his bistoury nearly perpendicular, with its edge directed externally, its point downwards, backwards, and a little inwards towards the uvula, he passes it through the integuments into the duct, and moves its point slightly backwards and forwards, to certify that the instrument has entered the canal; which is known by resistance being felt on all sides. Then, holding the bistoury with his left hand, he takes a small probe between the fore-finger and thumb of his right, and sliding it down the groove in the bistoury, passes it into the nasal duct, withdrawing the bistoury as the probe enters the canal. A nail headed style may afterwards be worn in the duct; should the surgeon deem it requisite.

M. Dupuytren uses a conical tube, or hollow style, which he passes down the groove of the bistoury into the duct, by means of a small iron instrument in form of a right



angle, pointed at one extremity to receive and support the tube, which being passed into the duct, the instrument or support is withdrawn. An engraving of the tube and its support may be seen in the notes to Mr. Travers' excellent work on the Diseases of the Eye.

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### EXTIRPATION OF THE EYE.

Cancerous and malignant fungus diseases are those, for the removal of which, this operation is most generally required.

Bartisch, a German oculist, was the first who published any account of the operation. In performing it he used a concave instrument with cutting edges, which he passed beneath the upper eyelid, and then scooped the eye from the orbit.

When it is the eye only which is to be extirpated it may be done as follows. The patient should either lie on his back with his head resting on pillows, or sit on a chair

and support his head against the breast of an assistant. The operator stands on the opposite side of the patient, to that on which he is about to operate, and, with the fingers of his left hand placed at the external angle of the orbit, he draws the integuments outwards, while with his right, he passes a straight bladed bistoury horizontally beneath the outer angle formed by the union of the two palpebræ, and by turning its edge and cutting out, he separates them from each other, and divides the integuments to the outer angle of the orbit. He then takes hold of the globe of the eye with a hook, and draws it a little way out of the orbit, and keeping it in that situation, passes his bistoury beneath the upper eyelid about the middle of the orbit, from whence he cuts inwards, and completes the circle by carrying the instrument at one sweep round the globe of the eye; an assistant raising and depressing alternately the upper and under eyelids. By



this circular incision the muscles attached to the globe are cut through; when the optic nerve, and other adhesions, are best divided by a pair of curved scissors. The lachrymal gland, situated on the upper and outer side of the orbit, is now to be hooked down and cut away. The hemorrhage which follows the operation will be suppressed by the application of lint within the orbit. Light dressing should then be applied.

When the palpebræ partake of the disease it is necessary to extirpate them with the eye: to effect this the hook should be passed from above downwards through both lids, as well as a part of the globe of the eye, which is to be drawn forwards, when the bistoury is introduced above the upper eyelid and the operation concluded as before.

In those cases M. Dupuytren is very particular in recommending that all the cellular tissue within the orbit be removed, in case it should partake of the disease.

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TREPHINING.

A fracture of the skull, with a portion of bone depressed on the brain producing comatose symptoms, is one cause which frequently requires this operation. It is also occasionally necessary for the removal of extravasated blood, or purulent matter, or for the extraction of a foreign substance lodged in the brain.

There are certain parts of the skull on which it has been recommended not to apply the trephine; such are the anterior and inferior angle of the parietal bone, where the middle artery of the dura mater is situated, and which, when running through a canal in the bone, must necessarily be wounded: but as in this case the hemorrhage may be stopped by the application of a little lint, or the vessel may be secured by a pair of fine forceps should it be situated only in a groove, the danger arising from its division ought not to be placed on a par with that of permitting the



cause of pressure, or irritation to remain. Over the different sutures and sinuses too, some surgeons have refrained to trephine, in consequence of the injury the dura mater would sustain from its intimate connection with the bone at these parts being torn through, or the danger which would arise from opening the sinus itself; but as many successful cases are related by Pott and others in which the operation has been performed over these parts the above objections appear to be overruled.

In order to practise the operation as conveniently as possible the patient should be placed close to the edge of the bed, his head resting on a thin pillow, which should be supported by some solid substance, as a thick book, or a piece of board, taking care, if possible, to have that part of the head where the trephine is to be applied the highest.

The head being securely fixed by an assis-

tant, the scalp is to be divided: if there be no depression of bone a longitudinal incision made in the direction of the fracture will be sufficient, but if the bone be depressed, a crucial one will be required. When there is no fear of wounding the brain in dividing the integuments, the cutthrough them should be continued down to the bone, so as to raise, if possible, the pericranium with the integuments. If this be not effected the pericranium must be divided in the same direction, and the bone denuded by dissecting back that membrane. The trephine, having its central pin properly arranged, is then taken by the operator, who, holding the handle firm in the palm of his hand, rests his index finger on the crown which he places over the portion of the bone that is to be removed, the instrument being perpendicular to that part of the skull on which it rests. He now by a half rotatory motion of his hand turns the instrument, which saws into the substance of the bone. As soon as



a sufficient channel is formed to confine the crown unassisted by the central pin, it is to be removed; or, as in the trephines of modern make, be drawn up into the column of the instrument. The crown now used is so made as to clear itself of the dust or sawn particles consequently there is no necessity for brushing it as formerly; however it will be proper for the assistant either to brush, or blow away the small portions of bone which may lie round the edge of the groove. The trephine being again applied, the bone is to be farther sawed, till the external table of the scull is cut through, which is often to be known by hemorrhage from the diploe. But as there is frequently no diploe, especially in very young or old subjects, it is always proper to examine with a probe to what extent the bone is cut through. The operation is to be continued with more caution, lest the membranes of the brain be injured by the teeth of the trephine. It will

therefore be necessary to examine, from time to time, with a probe to ascertain if the bone be sawn through at any one part. As soon as that is discovered to be the case the elevator is to be applied, and being used as a lever, with the hand for its fulcrum, the circular piece of bone is, if possible, to be raised. Otherwise the sawing is to be very cautiously prosecuted where the piece of bone appears most firmly connected with the rest of the cranium; and for this purpose, if there be one at hand, the half-trephine is the best instrument that can be used. Should a portion, splintered from the circular piece, remain projecting from the inner table, it should be broken off by a pair of forceps, or cut away with the lenticular knife. The flaps should be placed smoothly over the circular opening, a mild dressing applied with a soft compress of lint, and a double-headed roller.

In performing this operation the French surgeons use the Trepan. On the top or



head of the instrument, which is constructed like a carpenter's whimble, or centre-bit, the operator rests his chin, and turns the instrument from right to left till he has sawed through the bone. They say they give the preference to this instrument because it does not require so much manual force, or pressure, as the trephine; in consequence of which there is less danger of wounding the membranes of the brain.

## CONCLUSION.

The author trusts he has now fulfilled the engagement made in the outset of his work, and that the operations, though not detailed in the most elegant language, are so described as to be perfectly intelligible to every professional reader. It may not be out of place to observe, that, with regard to the ultimate result of Surgical operations in England and France, as far as the author has had an opportunity of noting, a greater proportion of patients recover after all operations in the London, than in the Paris Hospitals: this may, in part, be accounted for by the fact of patients being submitted to operations in Paris, on whom, in London it would be considered useless to operate; at the same time it must not be forgotten, that some of the leading French surgeons are very jealous in adopting any surgical improvement which may have had its origin on this side of the water; witness the reluctance on their part to the healing of



wounds by adhesion. After the operation for hernia the lips of the incision are not brought in contact but remain asunder, and the wound, filled with *charpie*, is left to granulate: in consequence of this, peritoneal inflammation generally succeeds, to which the patient frequently falls a victim. Out of seven cases of this kind, which the author witnessed at the Hotel Dieu during the winter of 1821, one only recovered. Nevertheless in quickness and dexterity of operating the Surgeons of France may rank before us, this, however, as is before stated, must be attributed to the facility with which they procure subjects, and the attention they bestow upon the practice of operating on the dead.

THE END.





