

History of a successful case of amputation at the hip-joint : (the limb 48 inches in circumference, 99 pounds weight) / by J. Sampson Gamgee.

Contributors

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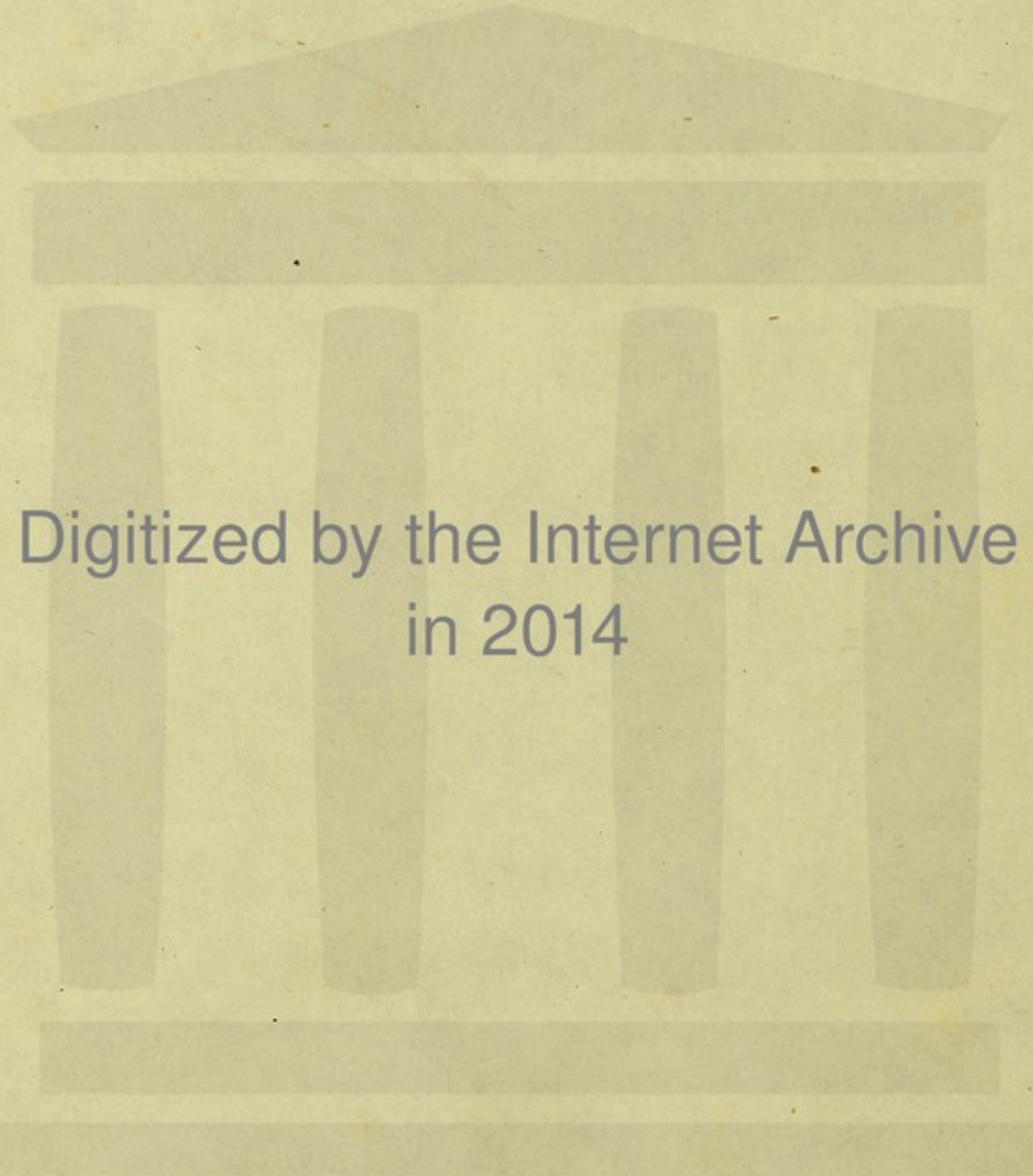
AMPUTATION AT THE HIP-JOINT.

J. SAMPSON GAMGEE.

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AMPUTATION AT THE HIP-JOINT.

BY THE SAME AUTHOR.

I.

RESEARCHES IN PATHOLOGICAL ANATOMY AND CLINICAL SURGERY,
With Six Plates.

II.

THE ADVANTAGES OF THE STARCHED APPARATUS IN THE TREATMENT
OF FRACTURES AND DISEASES OF THE JOINTS,
With Fourteen Illustrations.

(To this treatise the Council of University College awarded the Liston Gold Medal for Clinical Surgery, in 1853.)

III.

REFLECTIONS ON PETIT'S OPERATION, AND ON PURGATIVES AFTER
HERNIOTOMY.

IV.

IN THE PRESS, NEARLY READY,
CLINICAL LECTURES ON THE TREATMENT OF FRACTURES OF THE
LIMBS,
With numerous Illustrations.

¹³ Joseph Lister Esq. F.R.S.
with kind remembrance
The Author

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HISTORY

OF

A SUCCESSFUL CASE

OF

AMPUTATION AT THE HIP-JOINT,

(THE LIMB 48 INCHES IN CIRCUMFERENCE, 99 POUNDS WEIGHT).

BY

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CORRESPONDING MEMBER OF THE SOCIETY OF SURGERY OF PARIS.

WITH FOUR PHOTOGRAPHS, BY SARONY AND PIERRE-PETTIT.



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INTRODUCTION.

AMPUTATION at the Hip-joint can never cease to be a matter of more than ordinary interest, as one of the comparatively rare operations of Surgery, in which a vast wound is inflicted in immediate proximity to the trunk; with the certainty that, however well the case may be selected, however dexterously the manual procedure may be executed, and however prudently the after treatment may be directed, the result must prove fatal in a large number of instances.

The circumstances under which the operation here narrated was performed, were in many respects exceptional. The patient was so emaciated and weakened—almost exhausted—by the enormous and long-standing disease, and by poor living, that I should not have interfered, had I not been impressed with the man's calm courage, and been convinced of his constitutional soundness. The disease was growing so rapidly, and, on careful measurement, I found the space for operation so barely sufficient, that it was impossible to entertain the idea of delaying the disarticulation, while an endeavour was made, to improve the general powers. The man had apparently only a very few weeks to live; and in all probability a supply of nourishment, even had it resulted in some constitutional benefit, would have given such an impulse to the morbid growth as altogether to preclude operative interference. Immediate surgical action offered the only chance, and it was not delayed an hour beyond what was absolutely necessary for the preparation of instruments and apparatus; especially the aortic tourniquet and a suitable sling, to meet the extraordinary emergency.

The mass removed weighed upwards of 99 pounds, considerably more than half the weight of the entire body. Convalescence was rapid and the recovery complete—a result for which I am in great measure indebted to the able and untiring assistance I received, from my colleagues and pupils, during and after the operation.

A brief notice of the principal features of the case has already appeared in several of the British and Foreign Medical Periodicals, but that has been deemed insufficient.

Publication in the present form is undertaken at the suggestion made by many of my colleagues in the Society of Surgery of Paris, after I had the honour of addressing them on the case, and presenting to them the specimen, which has since been deposited, under the care of the Curator, PROFESSOR HOUL, in the Musée Dupuytren (No. 467^c of Diseases of the Osseous System).

Nothing can be further from my desire than to parade the case, on account of what may be called its mechanical difficulties, and the good fortune which attended the means employed to surmount them. The history abounds in such a variety of matters of pathological and clinical interest—it illustrates so many fundamental facts in surgical practice—and affords such striking evidence of the operation of natural laws, that the opportunity is availed of for a commentary, the perusal of which may be profitable to students, and not uninteresting to my brethren in practice.

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AUGUST 23, 1865.

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AMPUTATION AT THE HIP-JOINT.

1. PREVIOUS HISTORY OF THE PATIENT.

JOSEPH BRAMWELL, æt. 37, married, and the father of seven children, was admitted into the Queen's Hospital, Birmingham, the 3rd September, 1862. He stated that he had always been a very thin man, but enjoyed uninterrupted, good, general health. No hereditary predisposition traceable.

2. ORIGIN AND PROGRESS OF THE DISEASE.

In 1851, while the man was following his usual occupation, as a miner in a coal-pit, a piece of coal, about two hundred weight, fell on his right great toe, bruising it severely, and disabling him for some days. About a fortnight afterwards he casually noticed, while washing, that the right thigh was somewhat bigger than the left, but not at all painful. The enlargement did not affect any particular part, but was uniform all round the greater part of the shaft of the thigh bone. Recollection distinct that the latter, and not the soft parts, was the original seat of swelling.

The man was not prevented earning his livelihood in the coal-pit, though the thigh very steadily grew larger and heavier ;—always, however, painless at the seat of disease. Occasionally a numbing, dragging, sensation was felt about the ankle, more especially at night time.

The general health continued good, but in 1859 (eight years from the origin of the disease) the swelling of the right thigh bone had grown so much, in size and weight,

that Bramwell was unable to go on working as a miner, and induced to seek advice in the Bedford Infirmary. He was admitted into this Institution under Mr. H. W. Sharpin, who at once came to the correct conclusion that the knife was the only possible remedy, under the circumstances. As the patient objected to operative interference, he was soon afterwards discharged, and thenceforward earned a scanty subsistence as a farm labourer.

The girth of the right thigh in its largest part was 29 inches, in the autumn of 1860, when Bramwell was seen by Dr. C. C. Prior, of Bedford. This gentleman remarks, in an able note with which he has favoured me,—“I thought an operation for the enormous enlargement of the femur inexpedient, for the following reasons: 1stly, the man's good health; 2ndly, the utility of the limb, on which he could walk considerable distances; 3rdly, the integrity of the vessels and nerves; 4thly, the extreme hazard of the operation.”

At Midsummer, 1861, the patient was seen by Mr. Herbert Major Morgan, of Lichfield, who has kindly lent me an excellent photograph which he took of the whole figure. In it I perceive that emaciation, though considerable, is much less so than when the patient came under my care; and the limb, while already immense, was far from having attained its subsequent proportions. The measurements taken by Mr. H. M. Morgan, at the date referred to, were as follows:

	CIRCUMFERENCE.	
	RIGHT	LEFT
Thigh above swelling	. 20 inches	... 20 inches.
„ at thickest part	. 40 „	... 16 „
Knee . . . . .	. 35 „	... 15 „
Calf . . . . .	. 20 „	... 15 „
Ankle . . . . .	. 8½ „	... 8½ „

These data indicate that, at the time they were obtained, there was none of the swelling of the inguinal lymphatic glands, or of the œdema of the foot, which existed when the patient was admitted under my care about 15 months later.

The poor fellow was able to get about, doing some farming work, until the commencement of August, 1862—about three weeks before admission into the Queen's Hospital; but the great weight of the limb prevented him walking with freedom,

so that his earnings were inadequate to the maintenance of his numerous family, and he alleges that he was compelled to subsist chiefly on potatoes; very rarely taking meat. The wasting of the body progressed with the growth of the tumour, but the latter continued uniformly painless, in spite of the dragging weight and the extreme general debility.

3. THE PATIENT'S STATE ON ADMISSION INTO THE QUEEN'S HOSPITAL.

Very striking general emaciation; countenance pale, and expressive of great feebleness, but no special cachexia denoted. On percussion and auscultation the thoracic and abdominal cavities, with contained viscera, quite healthy.

On the left tibia, just below its tuberosity, was a very hard irregular exostosis, about the size and shape of two filberts joined at their base. Another equally solid bony tumour, about the size of a pullet's egg, was situated just above the left ankle joint, in the lower part of the interosseous space between the tibia and fibula, not, however in any way interfering with the motions of the ankle joint. Both these exostoses said to be congenital, to the best of the patient's recollection; neither had ever been the source of pain or inconvenience.

The enlargement of the right lower limb was so great, and so unyielding, as to raise the bed clothes more than an ordinary case of ovarian disease. To form an accurate estimate of the case from the adjoining photograph it must be observed that, although the man is lying on a soft mattress, into which the tumour dips, the heel is lifted from the bed; and, albeit the shoulders are raised on a considerable incline, the upper part of the diseased mass is on a level with the man's chin.

So general was the enlargement that it was impossible to determine the situation of the patella by manipulation, or by endeavour to flex at the knee, which was quite immoveable. The skin was quite pale and shining, but otherwise healthy on the anterior and external surface; posteriorly and towards the inner and lower part, the skin was red and superficially sloughed, a condition stated to be of very few days' date, and apparently referable to the pressure by the superincumbent weight. To give an idea how great this was, it may here be remarked, that on placing both hands, clasped together, under the leg, just above the heel, it was with great difficulty that the limb could be lifted off the bed.

Venous ramifications, some as thick as ordinary goose quills, were visible over the tumour in various directions, but chiefly on its outer and front aspect. With the finger, the course of these surface veins could be traced as a network of distinct channels in the solid mass, which, for the most part, was slightly nodulated, hard, and bone-like under superficial pressure and manipulation; but somewhat elastic on deep palpation.

The inner and lower part of the tumour, below the level of the bend of the opposite knee, gave a very distinct feeling of fluctuation over a surface of nearly five inches in each direction.

The movements of the hip-joint were little impaired—flexion especially. The inclination of the foot outwards was not much more than ordinary; but adduction and rotation inwards were somewhat interfered with by the great weight of the limb, which, though pretty evenly distributed all round, was greatest on the outer side.

The lymphatic glands of the body generally were healthy; but those situated in the right inguinal region were enlarged, to at least three times the ordinary size. They were freely moveable, not painful, and felt only a little more solid than in the healthy state; certainly not so hardened as to induce the belief that they were the seat of heterologous deposit.

Nothing abnormal perceptible on deep pressure in the iliac and lumbar regions on the corresponding side.

The right foot was very slightly oedematous on the anterior and inner aspect; but, as can be seen in the photograph (No. 1), its shape was not materially altered. The normal temperature and colour of the extremity, the pulsation of the arteries, and the very slight pitting under pressure about the ankle, left no doubt that the circulation of the extremity was practically unimpaired.

On a level with a point $3\frac{1}{2}$ inches above the opposite patella, the circumference of the right thigh was 48 inches. Longitudinally, the extent of the preternatural enlargement was $29\frac{3}{4}$ inches; the lower limit being $5\frac{1}{4}$ inches above the lower end of the internal malleolus. Posteriorly, the upper boundary of the diseased mass corresponded nearly to the level of the natal fold on the healthy side. Anteriorly the limits were as follows—the points being accurately measured to the upper edge of the tumour at its base: from the antero-superior spinous process of the ilium, $5\frac{1}{4}$ inches; from the centre of Poupart's ligament, 4 inches; and from the right spine of the pubis, 5 inches.



It is matter for some regret that when Bramwell was first admitted into the Queen's Hospital he was not weighed, so as to give an accurate standard by which to judge the relative weight of the limb amputated. At the time the photograph was taken at Lichfield by Mr. Herbert Major Morgan, the patient's weight was 161 lbs. The limb when amputated weighed a few ounces above 99 lbs., and it was then 8 inches greater in circumference, and the man was much more emaciated, than at the date of Mr. Morgan's examination. It may, therefore, be inferred that, after the operation was performed, the body was left not more, probably less, than half its previous weight. While on this point, though somewhat out of order, I may incidentally remark that, since the amputation at the hip-joint, the man has uninterruptedly enjoyed good health and become so much stouter, that on the 8th of March, of the present year, he weighed 199 lbs.—an increase of at least 100 lbs. since the operation.

4. DIAGNOSIS.

The origin of the enlargement on the thigh, imperceptibly as a uniform thickening of the diaphysis of the femur, the slow growth and the great weight of the limb indicated a solid, rather than a cystic, product. Its solidity was too great for a purely cartilaginous or fibrous tumour, not quite sufficiently so for a bone one. It appeared most probable that we had to deal with a material in process of ossification, and the enormous development, taken into consideration with the presence of the two exostoses on the opposite tibia, was presumptive evidence in favour of Ossifying Enchondroma. The enlargement below the level of the knee—elastic, very fluctuating, and of comparatively recent date, was evidently not of the same texture as the main growth—but one of those cystic formations not unfrequently met with, in a minor degree, in connection with pathological products of various character.

One of the most important questions to determine concerned the clinical character of the growth—was it malignant? To favour the affirmative solution we had—(a) the enlarged inguinal glands, (b) the distended veins, (c) the sloughed skin: with the following facts on the negative side—(a) the enlargement of the lymphatic glands was purely local, unaccompanied with special induration, and trifling in amount, considering the great source of irritation in the sloughed and reddened skin below; (b) distension of

superficial veins, often seen in encephaloid, presenting an appearance similar to the present case, is an accidental, not an essential, phenomenon ; (c) the skin had sloughed only at the back part, and since the man had been compelled to lie in bed ; the explanation seemed reasonable, that the destruction of surface tissue was due to mortification by pressure of the superincumbent weight. The freedom from pain, and the remarkable slowness and steadiness of the growth, the absence of the cachexia, the soundness of internal organs, was additional testimony against the diagnosis of cancer, in favour of ossifying enchondroma.

5. THE QUESTION OF OPERATION.

Scarcely a moment's reflection was required to convince a surgeon on first seeing the case that, assuming the diagnosis to be correct, the foremost question to be considered in the matter of treatment was : is it possible to remove all the disease without instantly imperilling life, and with a reasonable prospect of prolonging it sufficiently to justify the great risk to be incurred ? Life was such a burden, under existing circumstances, that the man pleaded to be operated upon, however great the immediate danger, in the unconcealed hope that the procedure would, one way or the other, put a speedy end to his trouble. This is a plea often urged with persistent force by patients when a great operation is in question ; but, while it should be listened to with calm attention, the surgeon ought not to give it undue weight. His aim should be to collect all the evidence on both sides, for and against operation, and to endeavour to pronounce judgment calmly, in the single interest of the life at stake. The patient, as an anxious advocate in his own cause, demands never-failing consideration, and the most vigilant and severe protection of the great interests he has at issue. A wrong judgment, in the momentous question of life, can never be extenuated on the ground that the sufferer implored it. Viewed in this aspect, the office of the operating surgeon is, beyond doubt, the one which makes the greatest call upon the highest and most varied faculties of our nature. Always ready to advise, and to put into immediate execution measures, which are often capable of summarily determining the issue of life, the operator requires a judicial mind to elicit evidence from nature—ever eloquent and varied, but, in our domain, in great part speechless ; he has to group and analyse his facts ; to study them in conjunction

with the results of experience as accumulated in the books; and to control his own instinct, according to the estimate he may form of the merits of the case, after the ripest thought. In surgical action resource cannot be too fertile, enthusiastic love of the art too ardent; the hand cannot be too cunning or too bold; but equally necessary is extended erudition, power of mental grasp, patience and accuracy in the minutest details, and delicacy of touch,—the sum of qualities, many of them rare, some of them almost incompatible, which was probably present to the mind of the great man who replied to the question, “What should a surgeon be?” “A physician and a good deal more.” Experience teaches that the above standard of surgical qualifications is, and ever must be, difficult of attainment. None the less it may be useful to practitioners, as to students it will always be found inspiring and ennobling, to contemplate the ideal of desirable and possible greatness in our art.

In determining the question of operation in the subject of this history I gave no heed to the urgency of the man’s request for interference with the knife, but my opinion was based on the following considerations: (*a*) assumed benignancy of the affection; (*b*) the temperament, placid and resolute; (*c*) on careful measurement I found there was just room, by careful adaptation to the peculiar circumstances, to obtain cover for the wound after disarticulation at the hip-joint; (*d*) the risk of hemorrhage, and the mechanical difficulty of removing the great mass with sufficient rapidity, did not concern me much, for I at once saw my way through the work. But the great matter was to determine the chances of life which in this case, it might reasonably be presumed, were much smaller than in amputation at the hip-joint generally, on account of the very great development of the vessels, the man’s emaciated condition, and the shock inseparable from the removal, as was evident must be the case even before the operation, of half the weight of the body.

It may incidentally have been noticed that, from the first, I weighed the evidence bearing on disarticulation at the hip, to the exclusion of amputation through the trochanters. The fact is, that the latter operation scarcely admitted of satisfactory mechanical performance; but clinically it was inadmissible, on account of the uncertainty attaching to the condition of the medullary canal of the femur. Experience teaches that alike in the simple cartilaginous, and in the various forms of cancerous growths of the long bones, two deposits very often co-exist—one as a plug in the marrow hole, the

other as a ferrule, of variable size, round the outside of the osseous structure; hence the general rule of practice, in cancerous disease of bone, to amputate at, or beyond, the joint above; in presumably non-malignant cases, to operate at a good distance from the seat of mischief. In the case of Joseph Bramwell, the diagnosis was in favour of benignancy; but there was so little room for the knife, that in the uncertainty concerning the condition of the medullary canal, I resolved to give the patient the benefit of the anatomical doubt, to ensure the removal of the disease in its entirety, in the event of operation being finally determined upon. The question was thus narrowed to examining the statistical evidence for and against amputation at the hip-joint, in relation to the particular case.

For sufficiently obvious reasons it may safely be admitted that, with rare exceptions, successful coxo-femoral disarticulations are on record, but that it is otherwise with the deaths, of which, for instance, I am acquainted with three speedy ones, in the practice of different surgeons, nowhere published; a number doubtless very inadequately representing the faults of omission in the desired statistics. It was sufficient for my purpose to know that the contemplated operation had repeatedly proved successful; generally, it is true, in cases which could not compare with the present one for mechanical and clinical difficulties, but these were, I thought, more than counterbalanced by the means which it was proposed to employ to surmount them.

I must confess to a very great distrust of almost all the surgical statistics extant, a feeling cherished with satisfaction, because with its growth I have become more and more convinced that the mortality, which the text-books teach is attendant upon the performance of great surgical operations, is in no way a necessary result, but in great measure due to a number of avoidable accidents and conditions.

Whatever be the statistical result, now on record, in any of the so-called capital operations of surgery, I think it is quite safe to predict that the mortality will be much smaller, provided a few cardinal points be held steadily in view. 1stly, to adapt the operative procedure to each particular case, regardless of systems and methods; 2ndly, to make no sacrifice to brilliancy of execution; 3rdly, to be most accurate and watchful in the minutest details; 4thly, to ensure constant and perfect cleanliness and ventilation; 5thly, to give no medicine unless absolutely required; when it is so, to steer a judicious course between the stuffing and incongruous pharmacy, inherited from

our predecessors, and the scepticism in medicine which now prevails; as doubts are always apt to do, when the progress of knowledge has resulted in the demolition of prejudices, and is not sufficiently advanced for the full demonstration of truths to replace them; 6thly, after-dressing should not only be as simple as possible, but so lightly applied as to give no pain. The slightest twitch may excite spasm, which it may be very difficult to allay, interrupt commencing union, occasion secondary hemorrhage, or give rise to so much pain as to interfere with the appetite and rest, and turn against the patient, slightly perhaps, but still fatally, the balance of probabilities; 7thly, it is of the highest importance that the surgeon should so master the disposition, and gain the confidence, of his patient, as to keep him tranquil, free from the horror of the instrument pocket case at the daily visit, and so reliant on the precautions taken to meet eventualities, as not to be intent on their possible occurrence.

To return to our case. The weight of evidence and probabilities seemed to promise a fair chance of success; my reasons for the diagnosis and proposed removal were approved by my colleagues, and instructions were given to prepare for the operation.

6. CRITICAL OBSERVATIONS ON MEDICAL AND SURGICAL STATISTICS.

The distrust, which I have incidentally expressed, of almost all the surgical statistics extant, must not be taken as evidence of my assent to the justice of the severe condemnation, which is, just now, pretty generally visited on the numerical method of medical and surgical investigation. The errors propounded after a faulty application of the statistical method are of unquestionable magnitude and frequency, and their pernicious influence is the greater because, advanced on the basis of a large number of observations with the parade of strict analysis, they command very general assent, and a good while elapses before evidence can be obtained in disproof. It must also be conceded that figures, like all other instruments, have a double operation, for good and evil respectively, according to the manner in which they are used; but it would be very deplorable if, in the presence of the misuse of statistics by some, of their exaggerated importance by others, we allowed them to fall in general estimation, as one of the most potent engines for the attainment of truth and the elimination of error, in the science of medicine almost above all others.

In medicine, as in other departments of knowledge, the greatest errors have been promulgated on the alleged foundation of facts. To test the value of such teaching, two inquiries have to be instituted; 1stly, into the reliability of the individual facts, 2ndly, into the soundness of the method of arranging them, and reasoning upon them. The mere enunciation of a proposition, on the basis of a number of facts, is repeatedly taken as evidence of proof, but on the slightest reflection it must be evident that it is not so. Great as was the value in his day of Morgagni's aphorism, *Observationes perpendendae non numerandae*, it is not applicable to our time; the copulative must now be substituted for the disjunctive, and the sentence then accurately expresses the order to be followed in the process of inquiry,—observations of fact have to be well weighed and then counted.

It is the peculiarity of the facts which come under our observation in medicine and surgery, that they are very rarely simple, often exceedingly complex; each fact is not a thing to be merely seen or felt, but only to be arrived at in the majority of instances by a process of reasoning, and by careful exclusion of every one of the many sources of fallacy. This difficulty of observation is greater, the facts being more complicated, in some departments than in others. It is in pathological anatomy and semeiology that observation is least beset with difficulty,—in etiology and therapeutics that it is most so.

Numerous and varied as are the structural appearances in disease, their physical characters admit of such faithful word painting, and such minute record with the aid of physical instruments, as to invite precision and facilitate the detection of error. The same observations apply in substance to the symptoms of disease, with this difference; that the variety being more extended, a larger number of classified observations is required for the foundation of inferences. Accordingly it is in determining the anatomical characters and the signs of particular maladies, that some of the principal victories have been achieved with the numerical method—to wit, Louis on Phthisis, Walshe on Cancer, Jenner on Fevers.

It is much to be desired that the natural history of disease, to the study of which the numerical method has proved particularly applicable, may be more widely investigated by its aid; for although the knowledge thereby gained may not directly conduce to the great requirement of our day—advancement in therapeutics—it is an essential foundation for their profitable study. A knowledge of the value of remedies in particular diseases pre-supposes ability to distinguish the latter in their various stages and complications,

and this result of the science of diagnosis requires wide and accurate investigation in the structural and dynamic phenomena of disease.

Let us take as an example the great question of the treatment of ovarian disease,—until very recently so generally dismissed as a hopeless matter, that scarcely anything was accurately known of it, when compulsory attention was directed to it by the cumulating surgical evidence of possible curability. What were the varieties of the disease, what their mode of origin, symptoms, and termination,—how could complications be diagnosed,—what were the effects, under different circumstances, of the local ailment on the adjoining organs, and on the general health, in a few words,—what the natural history of the disease, was, and to a very great extent still is, matter of the greatest uncertainty. Yet information on all those points is of the highest importance to determining the effect of treatment on a large number of patients in every possible condition, and to selecting the proper cases for operation, at the stage and under the circumstances, most conducive to success. The great road to this end is strict and extensive clinical and statistical investigation.

When we look back to the state of medical science, at home and abroad, which preceded the publication of LOUIS' *Examen de l'Examen de Broussais* (1834) we cannot be surprised that the disciples of the former became enthusiastic admirers of the numerical method, and were fired with indignation at the evil operation of false theories. But it is matter of regret, not unmixed with wonder, that some of Louis' ablest followers should have given themselves up to the idea that facts were everything and theories nothing—that numeration was omnipotent and scientific speculation and reasoning of no avail. Those were in error who professed to predicate the nature and course of disease from a knowledge of healthy structure and function; but scarcely less distant from the truth, though in an opposite direction, were those who taught that physiology was of no avail in the study of pathology,—who doubted that the science of life was one from its source, through vigorous maturity and decay, to death. Medical writers had previously erred in contemplating and depicting general effects, and working out of their own fertile imaginations visionary notions of the nature and progress of diseases; but when it became the fashion to investigate details, and to record the slightest minutiae, the opposite error was committed. A country cannot be accurately surveyed by galloping over it, but neither can a just conception be formed of

its climate, configuration, fertility, and mineral wealth, by crawling over its surface, and recording the physical characters of every puddle,—the colour, dimensions, specific gravity, and quantitative analysis of every pebble.

It has been conceded that the rise of the school of what may be called anatomical and statistical medicine, in contradistinction to the physiological and doctrinal, constituted an epoch of progress in medical history, and was the necessary reaction after the laxity of observation, and the fanciful theorisation, which had preceded it. But it must not be forgotten that the new school has relatively done very little to further our knowledge of the causes, the preventibility and, especially, the treatment of diseases. To these branches of the Science, the numerical method is also applicable; but as the vital conditions involved are much more varied and difficult of definition than are the physical characters of disease, the numbers analysed require to be much larger, and the inferences from them can only be regarded as approximately true and pertinent to particular cases.

These observations are as applicable to the study of surgery as of medicine conventionally so called, and “there can be little doubt but that, in operators of distinction, the ready fulfilment which the philanthropic wish to benefit others, and the ambitious yet legitimate scheme of self-distinction, meet with in our art, tends, in some measure, to disqualify for long and severe scientific pursuit. How disproportionate the feverish anxiety to multiply operative procedures, and the sluggish and loose endeavours made to discover the causes and preventibility of surgical deaths.”*

In the collection of surgical statistics, a large number of the circumstances most powerfully influencing the result, have been all but universally lost sight of, and it is only just to admit that the reasoning on surgical, as distinguished from medical, matters, in the lecture-room, in hospital wards, and in books, is chiefly remarkable for its superficial character, its disregard of the fundamental rules of evidence and logic, and for the abundant and most transparent fallacies with which it is hampered. “Those who exclusively applaud the practical have too often only a knowledge of the empirical and of unenlightened handicraft; in anathemizing theory they visit with the same judgment fantastic speculation and philosophical induction. They cannot understand that practice, in the legitimate application of the term, is impossible without science, and science

* *The Surgical Epoch.* An Introductory Lecture, by the same Author. 1857.

impossible without theory; which they sometimes condemn because incompetent for intellectual pursuit, at others because too idle to devote themselves to it, satisfied with the fame and the material advantages which their handicraft procures them. To utilise the truths of surgical science there can be no question that operations are one of the chief agencies, and hence it would seem impossible to direct to them too much attention. Neither is it possible in one sense. Operative surgery cannot be known too well; its student cannot be too skilful; but of this he must be careful, not to exclude from his consideration other equally important subjects."* It may reasonably be hoped that in a considerable number of surgical affections, the frequency of operations will steadily decrease, while the rules and resources for their performance in others will be reduced to something more nearly approaching scientific method and accuracy, than now prevails. Analysis of large numbers of cases of every variety, due attention being paid to essential particulars, and to the avoidance of all sources of fallacy, must result in the collection of a body of information of the highest utility in surgical practice; and it will then be unnecessary to reconcile confidence in the numerical method, as one of the most powerful aids to medical investigation, with expressed distrust in the value of extant surgical statistics.

7. PREPARATIONS FOR THE OPERATION.

My first concern was to devise means which should as effectually as possible check the flow of blood during the operation. I felt quite confident that, with the assistance of such colleagues as I was honoured with, everything would be done that was possible; but so greatly were the blood-vessels augmented in number and size, so massive was the diseased limb, even at its root, that the ordinary plan of controlling the femoral, and gripping the buttock in various parts while the bleeding mouths were being secured, must, I apprehend, have resulted in almost inevitably fatal hemorrhage.

I had a short time previously read Professor Syme's account of the great and successful operation he had performed by cutting into an aneurism of the iliac, turning out the clot, and securing the open mouths of the vessel;—a proceeding which had been rendered possible by the compression of the abdominal aorta with a large tourniquet, specially devised by Professor Lister. I made application to those gentlemen, and they

* *Opt. Cit.*

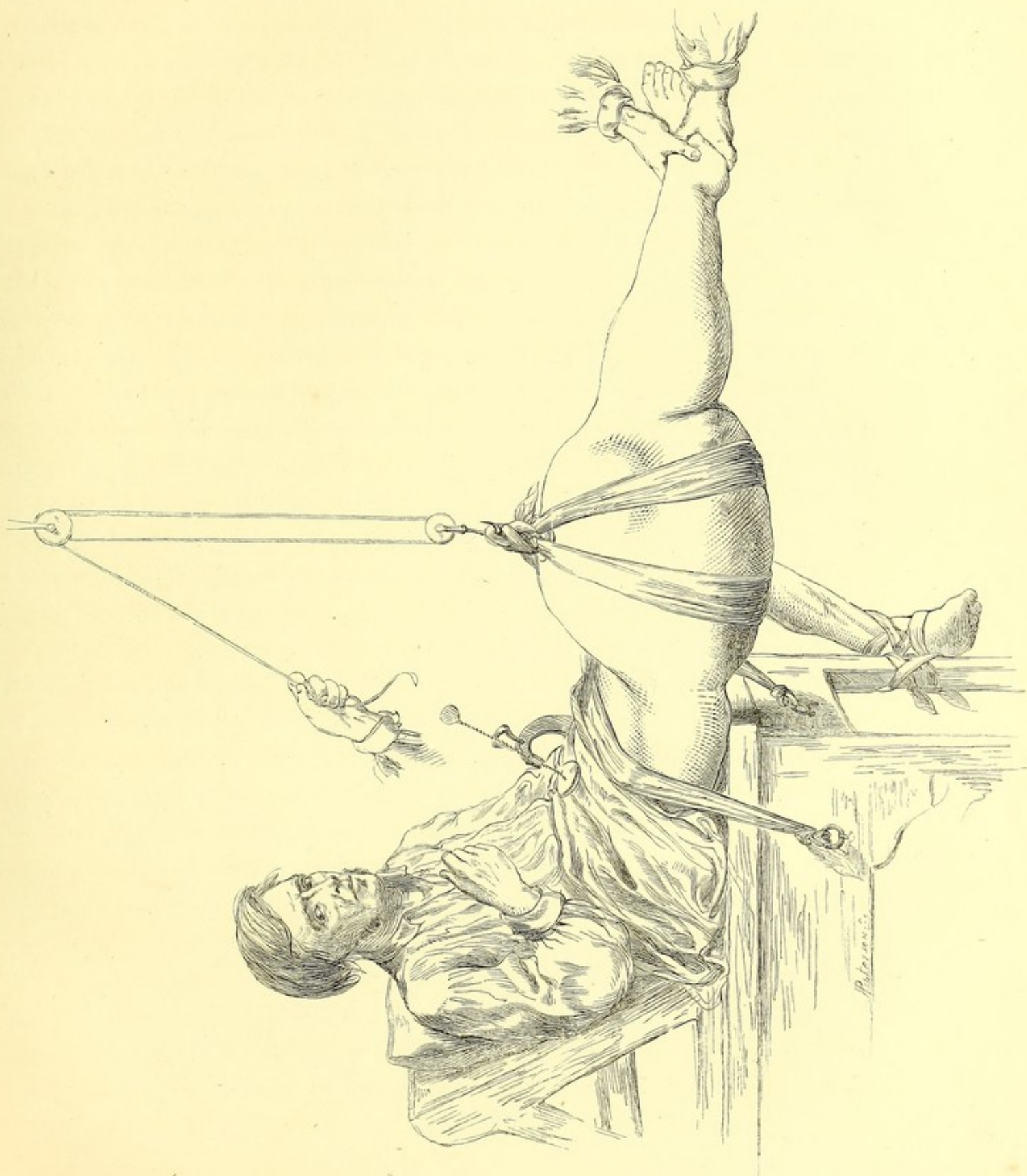
kindly presented me with one of the instruments for my case. It consists of an arc of steel, with a large pad at one end to press against the spine, and a long fine screw, with small pad, through the opposite extremity, to be pressed down with the force requisite to stop the circulation in the aorta. To prevent the instrument slipping, a strap admits of being fixed to the two ends round the body, on the side opposite to the tourniquet.

I had three iron rings fixed to the operating table, one at the end in the middle line, and another on each side about ten inches from the extremity, for the purpose of securing the patient, when raised for the operation, by stout bandages passed round the pelvis tied to each side ring, and carried between the legs to the ring at the end. By this means I ensured absolute fixity of the pelvis, without the cumbrous necessity of assistants standing round the table to prevent the patient slipping off.

The great weight of the limb and its unwieldy size were such that I could not expect any one to support it steadily, and move it gently and accurately, to co-operate with me with the indispensable precision. I therefore imagined slinging the limb, as represented in the annexed wood-cut. Two long towels were passed respectively round the upper and lower parts of the enlargement, joined in the middle line above, and secured on a hook attached to a small pulley; a similar pulley being fixed in a perpendicular line to a beam of the operating theatre. The assistant holding the pulley rope, stood on the right side of the one who took the front flap, so that the former was quite out of the way, and yet could most effectually with one hand raise or depress the limb very steadily, and to any degree, and at the same time have the right arm free for an emergency which I had contemplated. Another assistant held the foot as represented in the sketch, to rotate it inwards or outwards, and to raise or depress it, in the various stages of the operation, in conformity with the well-known rules for this disarticulation by antero-posterior flaps, the only one of the methods which could be best adapted to the emergencies of the particular case.

8. THE OPERATION.

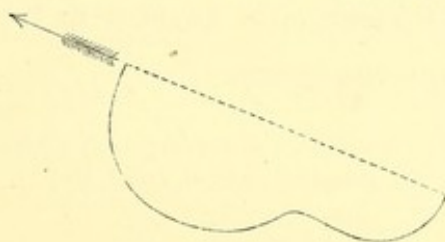
The operation was performed the morning of the 11th September, 1862. My colleague, Dr. Wade, administered chloroform, assisted by my brother, Dr. Arthur Gamgee. The patient having been secured as already described in the position represented



(pl. 2), and the limb suspended in the sling, Mr. W. Jones, our junior medical officer, was entrusted with the pulley-rope, Mr. T. Thompson, house surgeon, holding and directing the foot. My colleagues, Mr. Sands Cox, Mr. Furneaux Jordan, and Mr. J. St. S. Wilders, respectively took charge of the anterior and the posterior flap and the aortic tourniquet. In the unavoidable absence in the country of my colleague, Mr. J. F. West, I was favoured with the additional assistance of Mr. George Yates.

To avoid misunderstanding in the following description, I beg to recall the extent of the tumour towards the trunk. Anteriorly, the limits were as follows,—the points being accurately measured to the upper edge of the tumour at its base: from the antero-superior spinous process of the ilium, $5\frac{1}{4}$ inches; from the centre of Poupart's ligament, 4 inches, and from the right spine of the pubis, 5 inches,—the central measurement being the shortest, whereas it required to be the longest for making a well-shaped semi-elliptical flap. This, however, was out of the question, for I was clearly short of cover in front, especially in the middle line and just on its inner side. To compensate, the state of things was more satisfactory at the back, where the upper boundary of the diseased mass corresponded nearly to the level of the natal fold; but the tissue of the latter was loose and abundant, especially just where I was in need of material to make up for the anterior deficiency.

I selected a straight and stout backed, narrow, and long bladed knife. The limb being raised in the pulley-sling, a little higher than is shown in plate 2, to relax the parts at the groin, I introduced the point of the knife only just in front of, and quite close to, the tuberosity of the ischium; felt my way deliberately outwards and upwards for the head of the bone, transfixed the capsule, and then thrust the point quickly upwards, to come out as high as the antero-superior spine of the ilium, and just behind it. With the anterior half of the knife, holding the handle as a pivot, I cut the arc of a circle from the point of issue downwards to nearly the middle line, close to the tumour, and necessarily nearing Poupart's ligament; I now depressed the point of the knife, and with its heel cut the segment of a smaller circle to join the former one, dividing the great vessels at the point of union. This line may supplement my description of the anterior incision :



The front flap raised, the limb lowered a little, and the foot rotated outwards, I could already see the naked head of the bone, having at first well transfixed the capsule; the complete division of the latter, of the ligamentum teres, and of the external rotators was a very brief matter, but no sooner was the head of the bone free than it dropped behind the acetabulum;—I had foreseen this occurrence, as the probable result of the weight of the limb, and the action and position of the sling, and I had accordingly given instructions to the assistant holding the pulley-rope with the left hand, to be ready, at my request, to put his right arm under the upper part of the thigh, so as to push the head of the bone forwards, he at the same time lowering the sling a little, and the foot being also dropped. These instructions were exactly carried out; and steadying the head of the bone with my left hand, I placed the knife behind it and cut wide and long to save all the healthy structure I could close up to the tumour; I was fortunate in finding more tissue than I had anticipated at the back towards the inner side, and this. I cut particularly long to fill up the gap in front. I tied eighteen arteries, the femoral being immense and several of the others very large. The femoral vein was gaping with thickened and greatly distended walls, and looking very much like a source of mischief, so I put a stout ligature on it also. The regurgitant flow of blood on the first incision was something to be remembered; but so effectual was the aortic tourniquet that the great arterial mouths were left open and dry, and the operation was concluded as deliberately, and with as little hemorrhage, as an ordinary amputation of the fore-arm.

I introduced silver wire sutures at intervals of little more than an inch; but only approximated the edges lightly, leaving the suture ends long, and covering the cut edges with a piece of wet lint.

Immediately afterwards the man had a singularly fair pulse, and he soon rallied; the chloroform having been administered to complete insensibility, and without the least sickness, excitement, or fainting. A few drops of brandy were given on the table, and in about a quarter of an hour the man was removed to bed, in a small but very airy ward, with a dresser and nurse to be in attendance, and relieved by substitutes as often as might be deemed necessary, to ensure constant vigilance.* The right buttock was left exposed to the air, and the aortic tourniquet directed to be kept on the left side of the bed, ready for application on any emergency.

* The dressers to whom I am indebted for the performance of this duty—a duty which they discharged most conscientiously and ably—were Messrs. Adcock, Bell, Compson, Jackson, Lloyd, Mackey, Owen, Payne, and Thompson.

9. PROGRESS AND TREATMENT AFTER THE OPERATION.

The shock was gradually, but rather speedily, recovered from. At one p.m. the pulse was 110 and regular, the skin warm, the countenance calm, scarcely any pain being complained of.

A little before five p.m., an artery in the posterior flap bled so freely as to require a ligature, which was applied by Mr. Wilders, the house surgeon, to whom I am indebted for the most skilful attention to the case throughout its progress.

So soon as he recovered from the alarm of the hemorrhage, just referred to, the patient became calm and comfortable, and went on very well until eleven p.m. (twelve hours after operation), when rather free bleeding again took place. The abdominal tourniquet was applied, and three bleeding orifices ligatured in the anterior flap. The edges of the wound were now brought together accurately, and without the least traction; the silver wires twisted and cut short. The contact of the cut surfaces was perfect on the outer and inner side, but I intentionally left a dependent gap, about $1\frac{1}{2}$ inch in length, in the middle line. A strip of wet lint, placed along the edges, was ordered not to be disturbed, but to be kept constantly moist by frequently changing a superposed slightly wider piece of lint, soaked in iced water.

After this dressing the pulse was 126, and of very fair strength. The urine drawn off by means of a catheter. Ordered in a small draught, forty drops of the solution of hydrochlorate of morphia (P.L.); an ounce of port wine to be given about every three hours during the night.

September 12. Passed a comfortable night; no more hemorrhage, very little heat of skin; pulse 128; stump looks very well,—no discharge. Has occasional feeling of faintness and nausea, especially after taking the wine, instead of which to have brandy henceforward; opiate at night to be continued.

September 13. Passed a very good night; still complains of occasional faintness. Bowels have acted; no pain, with the exception of slight twitching in the stump, which now exudes a thin serous discharge. Urine high coloured, but passed without the aid of a catheter. Pulse ranges from 120 to 128. Continue opiate.

September 14. Pulse 116, stronger; passed a quiet, though rather sleepless, night. Discharge is becoming thicker and more purulent. Craves for food. To have an egg and a little fish. Continue opiate at night, brandy occasionally.

September 15. Passed a very good night. About 9.30 this morning, arterial blood gushed freely from the centre of the wound, which was nearly all united. The aortic tourniquet, applied at once, was retained with full pressure about ten minutes, with slight pressure nearly two hours. A large ox bladder, containing three pounds of pounded ice, placed over the anterior flap, to be renewed as rapidly as the ice melted.

September 16. No recurrence of bleeding, has passed a very good night—stump looks well, discharging creamy pus; pulse 114; tongue moist; bowels regular. The patient allowed a mutton chop for dinner. Port wine as before.

In the evening woke up from sleep feeling very low and faint, with a strong presentiment of impending dissolution. To have twenty drops of liquor opii and an ounce of brandy in a little water.

September 17. Slept well, feels much stronger; pulse 122; stump looking well. The ice was discontinued yesterday, and pressure kept up by means of a thick piece of sheet lead, weighing nearly one pound, cut and moulded to the shape of the anterior flap, on which it was placed; a piece of dry lint intervening. Repeat opiate at night. Brandy and other support allowed.

September 18. Passed a good night; condition of stump most satisfactory; pulse 126, stronger. Tongue clean and moist. Bowels open four times since yesterday. To have port wine instead of brandy. Half-a-drachm of tincture of catechu to be given with the opiate at night.

September 19. Morning: Countenance cheerful; wound healing healthily; no pain; tongue clean and moist; appetite good. Evening: Pulse 142. Purged several times during the day.

R.	Confectionis Aromaticæ	.	.	.	.	Two drachms.
	Tincturæ Catechu	.	.	.	.	Half-an-ounce.
	Misturæ Cretæ Compositæ	.	.	.	.	Half-a-pint.

M.

Two tablespoonfuls every four hours, while the diarrhœa continues.

September 20. Is rather feeble. Purging still continues, but in a less degree.

The tongue is clean ; urine clear. Pulse 120. Stump discharging freely ; the lint placed over edges of wound to be soaked in red lotion. Three of the silver wire stitches removed.

Two p.m. No purging since morning. To have custard pudding for dinner, and a glass of sherry.

The diarrhœa returning at night, the chalk mixture was repeated with the addition of half-a-drachm of Tincture Kino Co. to each dose. Lime-water to be mixed with the milk, and the opiate at night continued.

September 21. Passed a very good night ; appetite good ; wound in excellent condition ; one ligature separated from inner angle. Some complaint being made of soreness on the promontory of the sacrum, the patient placed on a water bed.

September 22. Pulse 108, stronger. General health very good. The skin of the lower flap being slightly excoriated with the discharge, to be protected henceforward with zinc ointment spread on a piece of lint. To have half-a-pint of sherry daily ; mutton chop for dinner ; the opiate in brandy at night.

September 23. Three ligatures separated, including the principal one from the femoral. Inability to pass water, relieved by catheter.

September 25. Pulse 108, and of good strength ; general health improving rapidly. The right inguinal glands have gradually diminished in size since the operation. All the ligatures came away from the inner angle of wound, five in number. Appearance of stump very satisfactory ; all the sutures have been taken out, pressure with the sheet lead continued. Discontinue sedative at night. Liberal nourishment.

September 27. Five ligatures separated from the front. Pulse 110 ; appetite good ; action of bowels regular. Is gaining flesh rapidly, and reports himself as well as ever he was in his life.

September 28. Two more ligatures came away.

September 30. Last ligature separated. Granulating edges touched with nitrate of silver. Pulse 108. Bowels confined and somewhat painful. Ordered half-an-ounce of castor oil.

October 2. Stump looks rather red and swollen ; discharge is very scanty ; granulations are pale, but there is no pain or constitutional disturbance. Tongue clean ; pulse 90 ; countenance cheerful. Water dressing substituted for red lotion ; pressure on anterior flap slightly increased.

October 3. Discharge has been profuse; redness and swelling diminished. Pulse 88.

October 14. The stump nearly healed, with the exception of one or two small places in front about the size of sixpences; scarcely any discharge.

The pressure with the leaden compress was continued and the patient removed to another ward, his health improved rapidly; and by the 25th of November the discharge had ceased and the stump was quite healed.

The photograph (pl. 3) was taken five months after the operation.

As already incidentally observed, Bramwell has enjoyed uninterrupted good health since the operation, having increased nearly 100 pounds in weight. His appearance is that of robust health. The cicatrix has never been a source of discomfort, and continues quite healthy; the exostoses on the left tibia preserve their size unaltered. They are never the seat of pain, and none have appeared in other parts of the body.

The history of the after treatment could not well have been more even. For the most part it does not afford matter for critical remark, and no attempt shall be made to mystify with words that which, by Nature's work, was beautifully simple. The pressure, employed to arrest the hemorrhage and promote the healing was at one moment of vital, and throughout of decided, importance; and the very liberal diet was in accordance with the established practice of the great majority of English surgeons; but these are matters deserving closer study. On the principles agreement is pretty general, but the practice leaves much to be desired.

10. ON SURGICAL DIETETICS.

If in any department of the science and art of healing, more than in another, it be true that the fundamental principles are the same, in medical and surgical practice, it is assuredly the case in Dietetics. My only purpose, in prefixing the term Surgical, is to disown pretension to a full treatment of the subject, while giving expression to reflections suggested by the treatment of the present case.

No one questions that the great aims of our profession are the conservation and restoration of health; but, as already hinted in these pages, there is much reason to fear that progress in therapeutics has not been commensurate with advancement in knowledge



of the nature and signs of disease. The disproportion would be less a matter for comment, if a belief in its diminishing ratio were warranted by critical observation of the results of investigation in the schools, and of the prevailing features of contemporary medical and surgical literature.

That scepticism is a very frequent, if not invariable, precursor of progress, may be admitted with justice, and likewise with encouraging hope for the future, in reviewing the present state of Medical Treatment. But doubt is converted into blind disbelief,—one of the most pernicious forms of ignorance—unless the endeavours to clear it up be incessant, well aimed, and carried out with philosophical method.

So varied are the conditions of life, so numerous and decided the peculiarities of individuals, especially in disease, that it is reasonable to expect that in therapeutics, however powerful the aid afforded by the guidance of general principles and indications, practice must in great measure be empirical in particular cases. Assuming this to be the necessary condition of things, it is still possible to labour for the establishment of those general principles on a sound experimental basis, and to descend in practice from generals to particulars, so as to approach, though it may be impossible to attain completely, the precision of an art.

The assimilation of food for the growth and repair of the body, is the function primarily involved in the maintenance and restoration of health; and the vigorous and healthy performance of all the functions requires a liberal scale of nutritious diet. It is well known that animals and men in training are very rarely subject to illness; and admitting that only the finest types, at the best stage of their existence, are submitted to the training process, there is no doubt that the system of management to which they are subject during its continuance, is greatly conducive to health, and to the very rapid repair of injuries whenever these are inflicted. One of the principal features of the training process, is the supply of a very liberal quantity of thoroughly good food, to compensate the waste of the organism by active exertion. The great practical point is to adjust the balance of waste and repair; and it is found that deviation beyond certain limits conduces to disease, and retards or prevents recovery. When it shall be possible for every one, particularly in early life, to have a full sufficiency of good food, the animal element in our climate and race being of first importance, a large number of prevailing diseases of the skin, the glands, the bones, and the joints, will become, in all probability, very rare, and the mean duration of life be proportionately lengthened.

It is in the out-patient department of many hospitals that these reflections are most frequently suggested. Here is a pale faced lad, with enlarged lymphatic glands, and a very slightly swollen, and scarcely painful knee of a few weeks' duration. Operative interference is clearly not called for, and the symptoms are otherwise not deemed urgent enough for admission into the house. The lad goes backward and forwards, with Scott's plasters, or short splints about the knee, and a prescription for a tonic and cod liver oil. What is wanted to avert the knife and save the life, is absolute rest and uniform compression of the joint, abundance of pure air, daily washing and friction of the skin, with plenty of new milk and meat, and a moderate quantity of wine or equivalent malt liquor. There is an emaciated man, with large indolent ulcer of the leg. Some hospitals positively have rules that such cases are not to be admitted into the institution, but they almost everywhere have the privilege of attendance as out-patients. To earn a wretched subsistence the poor man stands and works ten or twelve hours a day, attending at the hospital, once or twice weekly, for lint and lotion and a mixture to give tone to his appetite, when he has nothing to eat. Rest, position, nice bandaging, and fine living, during a few weeks, would, in a large number of instances, make such a man once more healthy, vigorous, and useful. The practical difficulties in the way of reform are many, but let us stare them in the face, and try to surmount them. The evil of such routine, miscalled medical practice, and the disregard of the fundamental laws and resources of nature, in hospitals especially, exerts a widely injurious influence beyond the individuals who are the immediate sufferers.

It is a noteworthy and regrettable fact, that in a department of knowledge like our own, needing more than almost any other, unprejudiced and constant observation and originality of thought, the reverence for authority has always been deep if not abject, engendering habits of routine—cramping and crippling the intellectual powers. The fundamental error is attributable to a contracted and superficial view of the functions of the profession. The prevention of disease is our first duty, and when a deviation from health has occurred in spite of our efforts, then it behoves us to forestal the probably succeeding stages; in other words, to arrest the development of the mischief. In doing this, the natural are the first and most powerful resources at our command. The prevailing habit of giving a medicinal prescription to every out-patient attending a hospital, and the comparative neglect of dietetics and balneology, and, in surgical

practice, of that trinity of healing graces rest, position, and pressure, are defects of extensive and prejudicial operation, in proportion as they impress themselves on the minds of our students. The question involved in these considerations is the famous one of the relative influence of nature and art in the treatment of disease. In this discussion, as in a multitude of others in medical science and literature, the disputants have frequently distinguished themselves as advocates—rarely as judges. Admitting the natural rarity of the judicial type of mind, it is yet possible to approach it by culture,—observing nature largely, studying medical history deeply and impartially, and ever remembering that truth rarely is in extremes, and that the moment a man becomes exclusive in his reasoning, or the partisan of any particular school in his teaching or practice, that moment he incurs the risk of leaving the path of natural truth.

It is only just to admit that nature is so powerfully conservative, so frequently able to surmount obstacles by the working of the variety of means co-ordinated for the attainment of its ends, that it is very difficult to demonstrate the beneficial or injurious effects of the majority of therapeutic agencies; hence justification of the tendency to adhere to practices supported by respectable authority, and the disinclination to risk life and fame by tentative innovation.

The opinion has been expressed that the success of the operation—to the record of which this memoir is devoted—was largely attributable to the liberal treatment of the patient in food and stimulants, an opinion which accords with the prevailing notions in English practice. But do we not carry them too far? Do not ill results frequently attend the operation of the principles, which culminated a few years since in that sweeping and most questionable expression, “the antiphlogistic action of alcohol in acute pneumonia?”

Before me is the history of a successful case of Amputation at the Hip-Joint performed nearly a quarter of a century ago.* The surgeon who operated, and the physician with whom he consulted in the after treatment, were gentlemen of such ability and eminence, that the practice they adopted may be regarded as stamped with the authority of the period. The patient was 23 years of age, in good health and rather inclined to stoutness. The disarticulation at the hip was performed for disease of a thigh stump after amputation, 14 years previously, for an affection of the knee-joint. Two days after

* *Memoir on Amputation of the Hip-Joint* (with a Successful Case), by William Sands Cox, F.R.S.: London, 1845.

the operation, the patient was only allowed weak tea, toast and water, and lemonade, and was ordered to take two ounces of compound senna draught, with three grains of calomel; the next day the compound senna draught was repeated, with the addition of an enema containing three ounces of castor oil. Same diet. The note the next day at 1.30 a.m. is, pulse extremely quick and irritable, countenance anxious, skin hot, thirst. Four hours later, the bowels not having acted, the aperient draught ordered to be repeated, the diet altered to mutton broth. After the lapse of twelve hours another castor oil enema prescribed. The next morning bowels not having acted, repeat the compound senna draught every three hours until they do;—diet still mutton broth. The bowels did obey freely, but as they were inclined to rest, a pill was ordered the next day, to be taken every six hours, with one grain of calomel and two of jalap. The eighth day after the operation, boiled mutton was allowed for dinner, but broth again took its place the day following. The 10th day the pulse was reported quick, small, and weak, and the anterior edges of the wound slightly ulcerated. A quinine mixture was ordered, with chicken and light pudding for dinner, and henceforward a mildly tonic course was pursued to recovery; but the commentary concludes—“Little or no meat, wine, or beer, was allowed. The suppuration frequently witnessed in stumps often arises from the injudicious administration of stimuli, under the absurd idea of giving tone to the system, and of supporting the patient under the discharges; the very secretion it is intended to prevent being, in point of fact, often thereby promoted.”

If we compare with this the liberal support in meat, wine, and spirits, given to Joseph Bramwell, it is not easy to explain in what manner the treatment in each case conduced to the successful issue. The therapeutic and dietetic contrast could not well be more marked—yet the practical result was identical,—complete and lasting recovery. There was certainly great difference in the condition of the patients before operation, and in the amount of structure removed, yet the powerful purgatives and the toast water given in the one case, and the chops and port wine allowed to the other, and originally weaker, patient, must in a few days have placed them nearly on a level for bodily strength. It is impossible to dismiss the supposition that in one or other of the two cases recovery occurred by virtue of that conservative power which enables the human frame to resist such extremes as the temperature of the arctic and the torrid zones—in spite of, instead of in virtue of, the conditions of the patient. The point to

determine, if possible without scholastic prejudice, is, which case was benefited by the treatment, in which of the two recovery should strictly be regarded as survivorship from the therapeutic and dietetic influence. Though evidence is wanting on which to base a direct and conclusive reply, it may be suggested that the more recent case, being the one which needed the support, accords with the doctrine of the modern change of type in diseases and constitutional states, necessitating a stimulating plan of treatment, where formerly a lowering one was indicated. The theory is not only remarkable for its plausibility, but for the respectable evidence which has been advanced in its support by some of the most remarkable thinkers and able writers in the profession, with no better result, however, in my estimation, than adding one more speculation to the many on which the verdict, after close analysis of the evidence, must be "not proven." Sometimes a theory is not only admissible but temporarily useful, as affording an explanation, which, if not the correct one, accounts better than any other for a series of facts, and bridges a chasm while inquiry supplies the materials for filling it up. It is because the "change of type" theory is founded on an assumption which tends to check the desire for investigation into the merits of the question, that I think its plausibility should not be accepted as compensating for the incomplete evidence on which it rests.

It must be confessed that the search for experimental results to determine the influence of various kinds of regimen in surgical practice, is not a satisfactory one, for want of precise records; but personal observation justifies the belief that the mortality in English surgical practice contrasts very favourably indeed with that of most continental nations.* The comparative simplicity of our operative procedures and dressings, the size and construction of our hospitals, and our greater, though not sufficient, attention to natural ventilation, are doubtless amongst the circumstances which exert a powerful influence on the comparative results; but an equally potent difference is that in diet, which in our practice is systematically liberal. Whether it be not too much so in many cases; whether sufficient attention be paid to the kinds of alimentation, and to the regularity of supply; what advantages may be derivable from severe regimen in particular cases; how far supply by the rectum may supplement the natural process of digestion; whether the tendency to death in many cases might not be averted, and lives spared, by more

* *Osservazioni sul Regime Dietetico dei malati Chirurgici*, di Giuseppe Sansone Gamgee: Firenze, 1854. *Osservazioni sul Regime Dietetico negli spedali di Parigi e di Londra*, del Medesimo Autore: Firenze, 1855.

determined persistence in furnishing materials to recruit the failing powers, are questions of great practical interest, intimately connected in daily practice with the highest, most interesting, most difficult, and least advanced of medical studies—"The Treatment of Disease."

11. A NOTE ON PRESSURE.

In recording the progress and treatment, after operation, of the subject of this memoir, it has been stated that at the termination of the third day after the amputation (September 15, p. 18), "arterial blood gushed freely from the centre of the wound, which was nearly all united. The aortic tourniquet, applied at once, was retained with full pressure nearly two hours. A large ox bladder, containing three pounds of pounded ice, was placed over the anterior flap, to be renewed as rapidly as the ice melted." After thirty hours, pressure was exerted by means of a thick piece of sheet-lead, accurately moulded to the anterior flap.

Had the rule been followed of opening the wound, to seek the bleeding mouth and tie it, I apprehend the patient's chances of life must have been greatly reduced, if not hopelessly destroyed. Adhesion between the surfaces was already so extensive, and so firm, that a great deal of new tissue must have been broken up in the search, with the great probability of opening other vessels, and the certainty of giving so much pain, and inducing such spasm, as to aggravate the exhaustion and prevent rest—one of the most important conditions in avoiding the recurrence of hemorrhage.

When cold and pressure are availed of, under similar circumstances, the desired result is frequently not attained, on account of the incomplete manner of the application, which requires to be thorough and unremitting for many hours. It is well known, but in practice too often forgotten, that pounded ice melts so rapidly on the surface of the body, that unless the bladder containing it be frequently changed, it is soon raised to the temperature of the body, and positively retains the local heat, instead of reducing it; it was for the purpose of doing this effectually, that the ice bladder was large, and its evenly pressing weight had the additional advantage of steadying the stump, and preventing spasm, which is, of all others, the most frequent exciting cause of secondary hemorrhage after amputations.

Rest is absolutely indispensable to the healing process, in the soft as in the hard structures of the body; and whatever causes movement, in direct measure interferes with union. Gentle, uniform, and continued pressure is the most powerful agency for maintaining the desired immobility, and at the same time it exerts a sedative influence by direct action, and, indirectly, by averting the cause of pain, which is motion.

If a bag of ice or sand be not sufficient by its weight to keep a stump at perfect rest, this end may be attained by the use of pasteboard or other easily moulded splints, which should be long enough to extend from the face of the stump upwards, to embrace the proximal joint. With an evenly applied bandage pressure can be applied to the great relief of the patient, and likewise to the prompt enhancement of the healing process, by preventing extravasation and promoting absorption. Strips of adhesive plaster are very inefficient aids to the maintenance of co-aptation, and I scarcely ever use any. They have the additional disadvantage of being a source of dirt, irritating the skin, and causing a good deal of pain, especially if the trifling, but to the patient's comfort most material, precaution be neglected, of shaving off the hairs before the plasters are applied.

The fear of causing mortification by the application of pressure, in the treatment of amputations and fractures, is founded on traditional prejudices, and fostered by injudicious practices for which there is only one remedy,—the teaching of enlightened and self-acquired experience. The gentle and perfectly uniform, the evenly-distributed, and in no way *constricting*, action, which I understand by pressure, is a therapeutic agency than which none is more demonstrably and extensively beneficial,—none, if carefully employed, less likely to be a source of mischief.*

12. DISSECTION OF THE LIMB. †

It has already been noted that the weight of the limb, ascertained immediately after the operation, was 99 pounds. When placed on the table for dissection it was as solid as when connected with the body, and retained the same shape and dimensions, (p. 2). Except where superficially ulcerated on the under surface, the skin was tense,

* *Clinical Lectures on the Treatment of Fractures of the Limbs*, by the same Author. In the Press.

† For the facts noted in this section I am in great measure indebted to the gentleman who conducted the dissection, Mr. JOHN LLOYD, at that date my Senior Dresser, now Professor of Anatomy in the Queen's College.

thin, and colourless, but here and there marked by veins of considerable size, running principally in the direction from below upwards. There was no subcutaneous fat, and the subcutaneous nerves were so attenuated that it was not possible to trace them.

The fascia lata was very much thinned, and spread as a thin semi-transparent layer over the surface of the tumour. The incisions in the operation having been carried close to, and for a considerable distance on, the tumour, it was with some difficulty that the pale and attenuated muscular fibres could be traced out. The Rectus Femoris had the most natural appearance, being the best nourished and the least displaced of the muscles, as it passed to its insertion in the patella down a channel nearly three inches deep, formed by the mass of tumour rising up on each side. The sartorius, gracilis, semi-membranosus, semi-tendinosus, part of the biceps, and the vertical fibres of the adductor magnus reaching down to the inner condyle of the femur, were followed over the elevations and depressions of the growth, in wavy irregular planes distributed after the fashion of the staves of a barrel.

The venous channels, which could be felt through the skin during life, could, after removal of the integuments, be readily followed on the surface of the mass, here and there dipping between the nodules, amidst dense and reddish connecting tissue.

The femoral artery, healthy in structure, but distended to fully twice its natural size, ran over the growth, about $2\frac{1}{2}$ inches from the surface, in a tortuous groove formed amidst the nodular masses of the tumour. Through the same channel the artery, accompanied by the femoral vein and the saphenous nerve, passed to its normal position in the popliteal space.

Several large arterial branches were traceable, from the wide-open mouths on the upper surface into the lobulated growth. The close connection of the veins to the surrounding solid prevented their walls collapsing, but structurally all the vessels were perfectly healthy.

The surface of the tumour was closely invested with a fine translucent fibrous structure, prolongations of which dipped between the nodules that formed the mass; these varied widely in size, from $\frac{1}{4}$ th of an inch to 3 inches in circumference. Their shining surface, of blueish or pinkish white colour, at once gave the idea of cartilaginous texture, and this was borne out by the peculiarly firm elastic feel. Here and there the hardness was almost bony, and on thrusting the knife in different directions, the

characteristic gristly sensation was experienced, with occasionally the sharp and gritty hardness of calcareous deposit.

Dissection of the posterior aspect exhibited the muscles, as in front, thinned and stretched over the tumour. The great sciatic nerve was much flattened and expanded, to nearly $1\frac{1}{2}$ inch in breadth at the upper part; a little above the middle of the thigh it became imbedded in a deep groove, formed by the growing up on each side of it of the morbid deposit. In the popliteal space the nerve gained its normal position.

The upper and middle part of the tumour on its posterior aspect answered to the description already given of the mass in front; but 16 inches from the upper limit projected behind the knee a soft pendulous mass, which careful dissection proved to be structurally continuous with the cartilage-like product above; it descended beneath the fascia, over the popliteal space to the junction of the middle with the lower third of the leg, but unconnected with the tibia and fibula. When thus dissected the dimensions of the diseased mass proved to differ very little from those taken during life. The maximum circumference mid-thigh, $46\frac{1}{2}$ inches; extreme length 29 inches. The weight, which was 99 pounds immediately after the operation, was reduced to $93\frac{1}{2}$ pounds by the removal of skin and soft structure, necessary for exhibiting the relation and outlines of the specimen.

From the centre and upper part of the tumour projected four inches of the femur, much thickened, but healthy-looking. The neck was almost obliterated, and nearly horizontal; the head expanded and flattened; and the broad and massive trochanter looking much more like the upper extremity of the femur of an ox than of a man.

The knee-joint proved to be free from ankylosis, its immobility being referable to the mass of diseased structure which everywhere surrounded it. The principal thigh tumour reached down to the very articular edge of the condyle, and the soft portion projected downward behind the tibia and fibula, but was unconnected with them. On the posterior surface of the tibia, but structurally not continuous with the tumour, were four small white and very hard exostoses not above $\frac{3}{4}$ of an inch in diameter; but a much larger one ($2\frac{1}{2}$ inches in circumference) was situated on the posterior surface of the same bone, 3 inches below the knee.

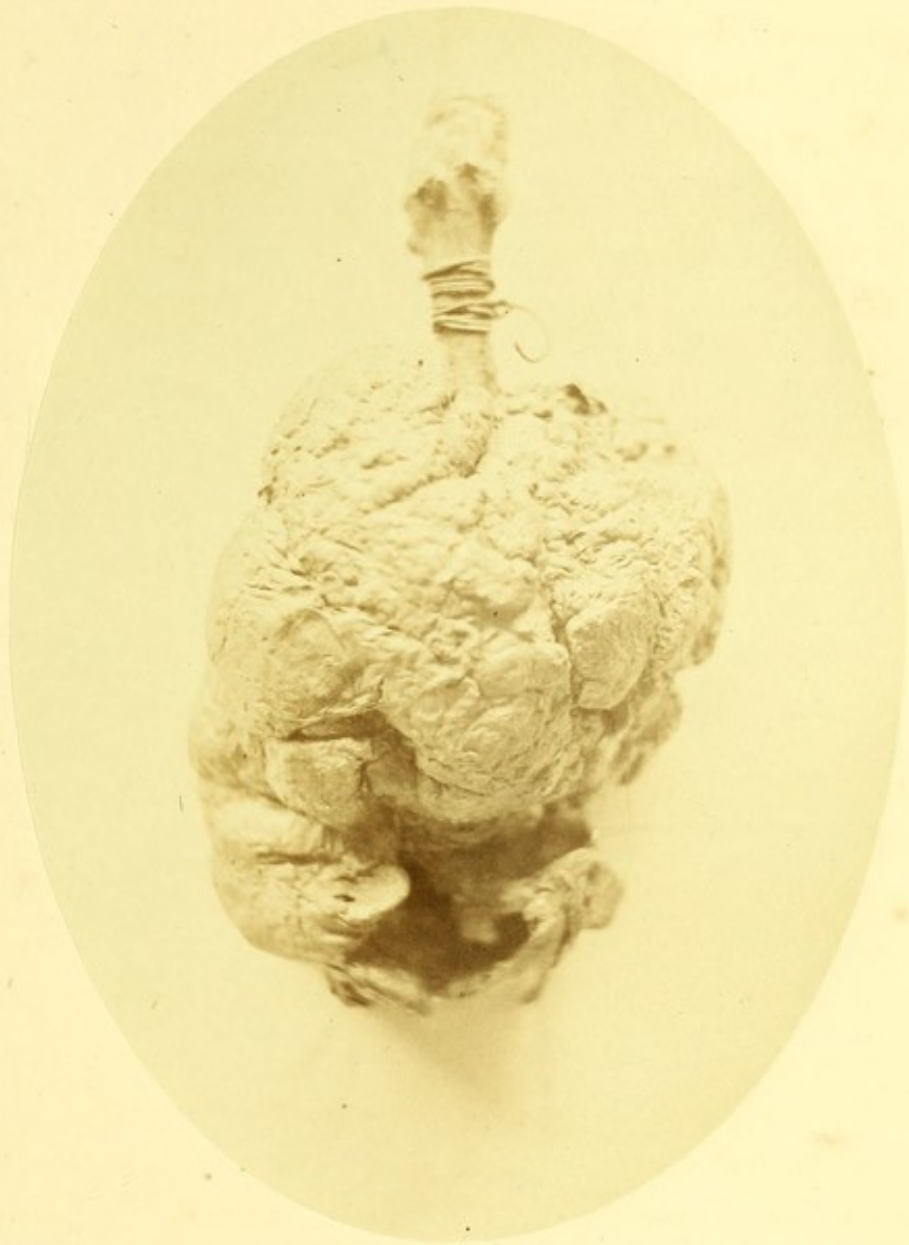
The section of the tumour was commenced with the lower and softer portion, in the centre of which was a large cavity filled with a brownish red purulent looking fluid, devoid

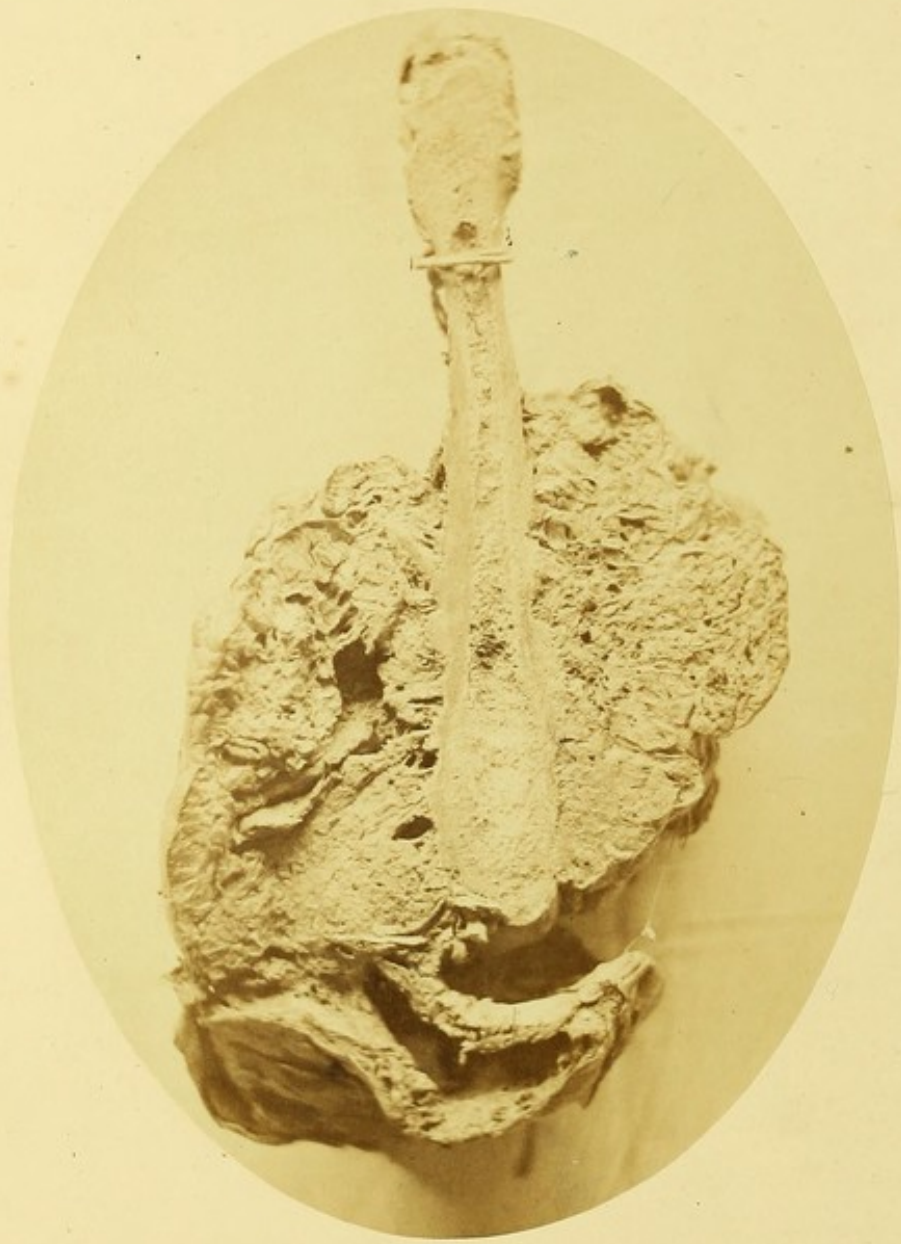
however, of pus corpuscles, and abounding in amorphous granular matter under the microscope. The walls of the cavity varied from $\frac{1}{3}$ to $\frac{3}{4}$ of an inch in thickness, and were continuous with the upper and more solid portion of the growth. Inside, and upon the cyst-wall, were numerous little nodules, the more perfect of which accurately resembled those forming the mass of the tumour; the majority of those in the cavity, however, were softened, and in process of disintegration, some friable, others pasty, and a few firm, elastic, and cartilage-like, under section.

On cutting off two or three of the smaller nodules from the main body of the tumour, their cartilaginous structure was at once apparent to the naked eye, and to the microscope; a good deal of amorphous earthy matter being deposited at intervals between the cells, and accounting for the gritty sensation occasionally imparted to the knife. Here and there the structure presented, though imperfectly and irregularly, the appearances of bone. The vertical section in the middle line of the thigh tumour was executed in my presence in the Musée Dupuytren, at Paris, under the superintendence of the Curator, Professor Houel, to whom I am indebted for the description.

The section required to be made with the saw, so advanced, in some parts, was the process of calcification. From the outer surface of the femur sprang a considerable number of osseous spiculae perpendicularly to the length of the bone; many of them traverse the whole depth of the tumour and intersect in a variety of ways, the interstices thus formed being filled with cartilaginous matter of typical appearance to the naked eye. In some points the structure was more vascular and soft than in others, and in a few places the softening had advanced so far that excavations or imperfect looking cysts had resulted. In the main, however, the mass was solid. The compact tissue of the femur was a good deal hypertrophied,—to double the ordinary thickness in the middle line; but in the lower third it was in some places so much rarefied as to make apparent the contiguity of the cartilaginous structure of the tumour, and of a deposit of similar tissue, which infiltrated the cancellous structure of the condyles, filled the medullary canal, and extended upwards into the bony meshes as high as the trochanter major, and even slightly into the lower part of the cervix femoris. The microscopic examination of Professors Houel and Robin, confirmed the fact already cited that the specimen was one of Ossifying Enchondroma.

The annexed photographic representations of the tumour and its section (plates 4





and 5) were taken some time after it had been immersed in spirit, and had consequently shrunk. The specimen having been suspended for the convenience of the artist, the mass surrounding the bone has fallen to a lower level than it originally occupied, its upper limit having been on a level with the great trochanter.

13. PATHOLOGICAL NOTE AND REFERENCE TO CASES.

One of the most remarkable features in the object of this commentary was unquestionably the co-existence of the gigantic cartilaginous product with the evidences of the ossific diathesis,—the exostoses stealthily developed, apparently without history; the enchondroma with a marked period of origin, well defined and uninterrupted growth. The patient's statement that the parallel exostoses on the legs had existed since birth, and had not been a source of pain or discomfort, is consistent with the absolutely unchanged condition of the growths on the left tibia since the amputation.

Although the period which has elapsed since the operation and the man's restoration to vigorous health do not altogether preclude the possibility of recurrence, they yet render it extremely improbable; and the case is on record as one of the rarest, for the enormous bulk of the non-malignant disease, and for the speedy and complete recovery, notwithstanding the previously very debilitated condition, of the patient.

On examining clinical records for analogous cases, I find the one most closely approaching to the subject of this memoir, recorded by M. R. A. Frogley, in the *Medico-Chirurgical Transactions* (vol. vii, 2nd series, 1843, p. 133, *et seq.*). The patient, a female, æt. 26, of apparently healthy constitution was the subject of a tumour, measuring in its greatest circumference $35\frac{1}{2}$ inches, and extending from the knee-joint to within an inch of the trochanters, immediately below which the limb was amputated with complete success. The bulk of the tumour was made up of numerous cartilaginous cysts, many of which communicated with each other, so as to form a large central cavity, in which was contained several pints of a tenacious yellow honey-like fluid. The wall of the cysts being about a quarter of an inch in thickness, was composed of a whitish elastic tissue resembling cartilage, but rather more transparent: there was very little deposit of osseous tissue.

A similar, but pathologically still more extraordinary case, is the one placed on record by Sir Philip Crampton. I am greatly indebted for the perusal of the original memoir to Mr. Thomas Taylor, and am induced by its inaccessibility to quote it at length :

“A gentleman,* about thirty-eight years of age, who for seventeen years laboured under an osteosarcomatous tumour, which grew from the upper part of the os femoris, continued until within the last three months of his life to delight the society in which he lived by the charms of his conversation, and by the exercise of his unequalled musical talents. Before his death the tumour acquired an almost incredible magnitude, it measured (including the thigh) six feet six inches circumference. A few hours before his death he vomited several quarts of a brownish colour fluid, and died in the act of vomiting, in consequence of some of the fluid regurgitating into the trachea, and causing suffocation.† The body was carefully examined on the following day by my friend Mr. M. M’Namara and myself; all the viscera were perfectly sound. The tumour formed a vast cavity, the walls of which varied in thickness from six to twelve inches; the cavity contained several quarts of a fluid, which in colour, odour, and consistence, exactly resembled that which had been vomited before death. The walls of the tumour consisted of a firm cartilaginous structure, intermixed with bone, the bone being deposited in flat plates, on the outer surface and in small nodules (about the size of grains of shot) on the inner surface of the cavity. It appeared plainly that the tumour was enlarged by the constant deposition of a semi-transparent gelatinous matter in large hemispherical granulations, each about half an inch in diameter; these gradually became consolidated into a substance resembling cartilage, and in the centre of each of these granulations was a small nodule of bone; a part of the tumour had passed over the brim of the pelvis, and pushed into its cavity, but the peritoneum was unbroken, and no connection could be traced between the cavity of the tumour and the intestines; in fact the cavity did not extend beyond the upper part of the thigh, and was completely enclosed by the thick cartilaginous walls. Nothing remained of the

* *The Dublin Hospital Reports and Communications in Medicine and Surgery*, vol. iv, p. 543, *et seq.*: Dublin, 1827.

† In its earlier stages, this case was seen by Sir A. Cooper and Mr. Abernethy in London, and by the Baron Dupuytren in Paris. It was, however, during the last three years that the tumour acquired such an extraordinary development. When Sir A. Cooper and Mr. Abernethy saw it in the year 1817 (four years previous to the death of the patient), the tumour, including the thigh, measured about three feet six inches in circumference.

os femoris except its head, and about four inches of its lower extremity; nevertheless, so firm were the walls of the tumour, that to the last the patient was able to support his weight, and even to walk upon the diseased limb. The stomach, which appeared to be totally free from disease, contained about a pint of fluid perfectly similar, in all its apparent qualities, to that which was found in the cavity of the tumour. That there was nothing *malignant* in the character of this tumour may be inferred from the circumstance of its having subsisted for seventeen years without exciting any unfavourable influence on the general health, from its never having ulcerated, or thrown out a fungus, and from the absence of all disease in the glandular system or in the viscera."

In the latter case, as in Mr. Frogley's, the structural degeneration was so extensive as to give predominance to the cystic character of the growth. It is very rare that a cartilaginous tumour attains any considerable dimensions without some disintegration of the deeper tissue, but this is a pathological occurrence of variable extent, in no way affecting the essential anatomical characters of the growth, or its clinical disposition. Morbid deposits of cartilage are remarkable amongst non-malignant formations for the great variety of structures and organs they affect, for the diversity of their anatomical configuration and microscopic structure, and for their magnitude and frequent multiplicity: when to these is added their not unfrequent tendency to recurrence after removal, sufficient reason has been adduced for placing Enchondromatous growths in a position intermediate between the cancerous and the non-malignant.



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