THE ORTHOPAEDIC CLINIC OF THE UNIVERSITY OF LUND
(CHIEF: PROF. G. WIBERG)

TWO CASES OF HINDQUARTER-AMPUTATION

By

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Bone destructive processes extending from the pelvis or encroaching upon the pelvis from the region of the upper thigh bone were regarded until the end of the thirties as almost inaccessible to a rational surgical therapy. The results of earlier attempts did not encourage any successors. Operations of this type fell into the category of desperate measures and published cases have been few.

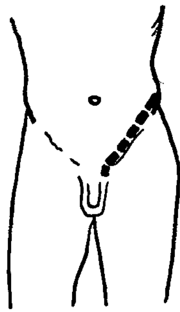
As far as is known officially, Billroth was in 1889 the first to attempt a hemipelvectomy or as the operation is now usually designated, a hindquarter-amputation, or interinnomino-abdominal operation. This patient died some hours after the intervention, probably from post-operative shock. The first successful hindquarter-amputation is attributed to Girard and was carried out in 1895.—Forty years later the mortality rate of the operation was estimated as fully 60 % and the number of known operations up to the year 1935 is given as approximately 110 to 130 cases.

From the end of the thirties or the beginning of the forties, however, a considerable reduction in the mortality rate of the operation made itself apparent. After 1940 this was estimated to be less than 20 % (Gordon-Taylor, Wiles, Beck and Bickel, and some others). In 1946 a report was issued from the Mayo Clinic concerning twelve cases operated on during the years 1943–1946 all of whom survived the intervention (Beck and Bickel). A series of 50 cases from the Middlesex Hospital in London covering the years 1922–1950 was published in February, 1952 (Gordon-Taylor, Wiles, Patey, Warwick and Monro). Eleven of these cases were operated on before 1940, with a mortality rate of 36 %. In the rest of the series, 39 cases from the period 1940–1950, the mortality rate was 18 %.—The reason for the considerable decrease in the surgical risks in recent years is to be found first of all in the technical improvement made in that part of the operation which is the special field of the anaesthetist,—the ad-

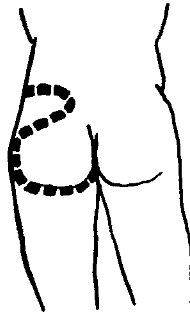
ministering of narcosis, shock prophylaxis, and counter-measures against shock. The operation still exposes the patient to great risk, but with respect to the prognostic outlook, the surgeon today sees himself in a position to propose this operation in certain cases which were previously regarded as inoperable.

In earlier series the indications were often osteomyelites and tuberculosis, but during the last two decades the operation has been almost exclusively determined by neoplastic growths. Apart from the usual precautions before operation, such as concern the patient's general state of health, the nature of the process and possible metastatic conditions, prerequisite conditions for operation are that the process must be unilateral and that it must not extend to the pelvic viscera or sacrum. Moreover it is desirable that the part of the os ilium which borders the sacrum should be spared, since the prognostic outlook is considered to be worse and the prosthesis problem to be increased if exarticulation is performed on the sacroiliac joint.

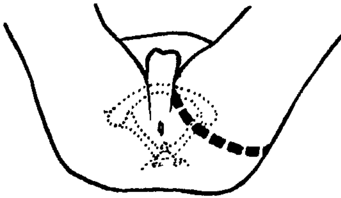
At operation the patient is so placed that he lies on the healthy side and the intervention is performed in two sections. A ventral incision is first made. From the junction between the thigh and the perineum the incision is continued upwards across the symphysis region and further just above the inguinal ligament and the iliac crest to the point upon the latter where it is intended to saw through the os ilium. This is customarily at the transition between the middle and the dorsal third of the iliac crest if the size of the tumor permits. Then the incision is deepened through the musculature attached to the iliac crest and the inguinal ligament is severed at the spina iliaca anterior superior. Blunt dissection is then continued behind the peritoneum while at the same time the peritoneum is retracted medially until the region of the acetabulum's medial wall is reached. This satisfies a most desired condition, that one should obtain as early as possible a precise view of the possible growth of the tumor in the above direction, thus preventing any surprises later in the course of the operation. Abdominal viscera—in males, the funiculus as well, which is detached—are medially conducted, and afterwards the incision is deepened forward and medially over the symphysis region. The attachments of the inguinal ligament and of the rectus muscle to the pubis are cut and the deep epigastric vessels are ligated and severed. After the urinary bladder's anterior wall has been detached so that the bladder can be retracted, the symphysis is divided. At this point the surgeon should convince himself that the symphysis is completely severed since later during the course of the operation he has to rely on this being so.



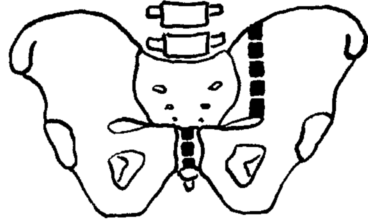
The ventral incision.



The dorsal incision.

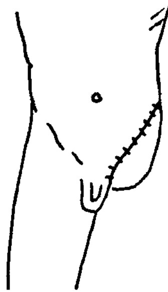


The perineal incision.



The osteotomy.

Fig. 1.



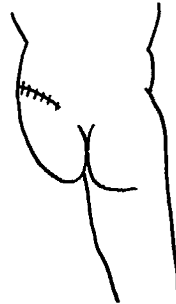
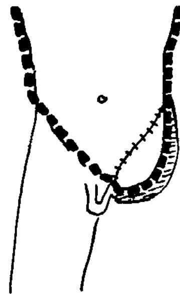


Fig. 2.
The sutured wound.



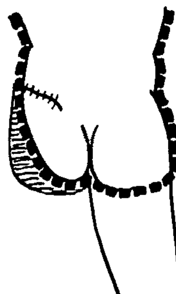


Fig. 3.
The supporting part of the prosthesis with restoration of the shape of the pelvis.

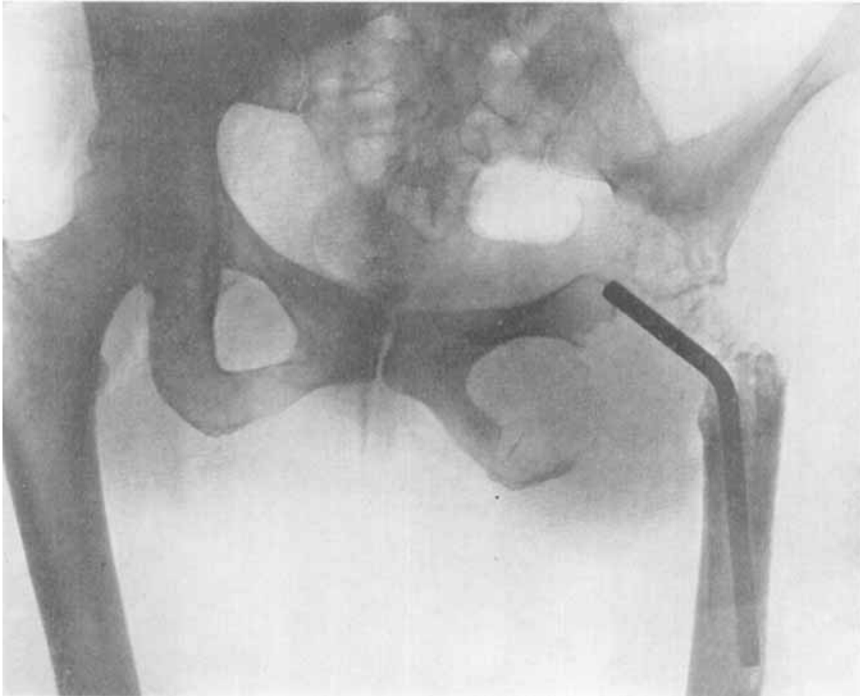


Fig. 4.
Case 1. Before operation.

The femoral vascular bundle is now followed upward as far as the vena and arteria iliaca communis which together with the femoral nerve are ligated and severed. The psoas musculature is divided on a level with the sacro-iliac joint and turned up laterally so that the obturator vessel and obturator nerve are exposed and can be ligated and severed. The foramen ischiadicum majus can now be palpated and the second part of the operation is proceeded with.

The dorsal incision commences from the wound angle at the iliac crest made by the ventral incision and makes a forward curve over the region of the trochanter as far as the fold of the buttock which is followed around the dorsal part of the thigh. The caudal wound angle made by the ventral incision is met in the region of the tuber ischii.

The wound is deepened until it extends through the aponeurosis to the glutaeus maximus. The dorsal flap of skin is turned back together with as much of the glutaeus maximus as is attached to that part of the os ilium which it is intended to leave intact. The glutaeus medius is divided and the foramen ischiadicum majus is sought. A

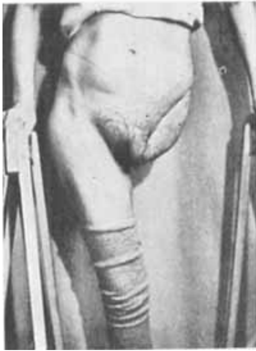


Fig. 5 a.

Fig. 5 b.

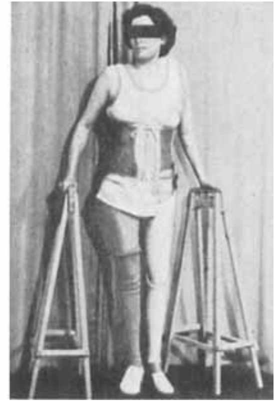


Fig. 5 c.

Fig. 5 d.

Fig. 5 e.

Fig. 5 f.

Gigli saw is passed through to the inner side of the pelvis and the ala ossis ilei is sawn through. The risk of blood oozing is present owing to the lesions produced when sawing, but because the symphysis had previously been cut through, the one half of the pelvis can now be turned up "like a mussel shell" and the bleeding can quickly be brought under control. The remaining muscle attachments on the ramus inferior pubis and the os ischium are periosteally freed and the regional blood vessels are ligated. The amputation is concluded by the severing of the sacrotuberous ligament, the sacrospinous ligament, the pyriformis muscle and the ischiadic nerve.

The wound is closed by suturing the glutaeus maximus to the anterior abdominal musculature and to the psoas attachment. Then this is followed by the customary skin suture. (Fig. 1–2).

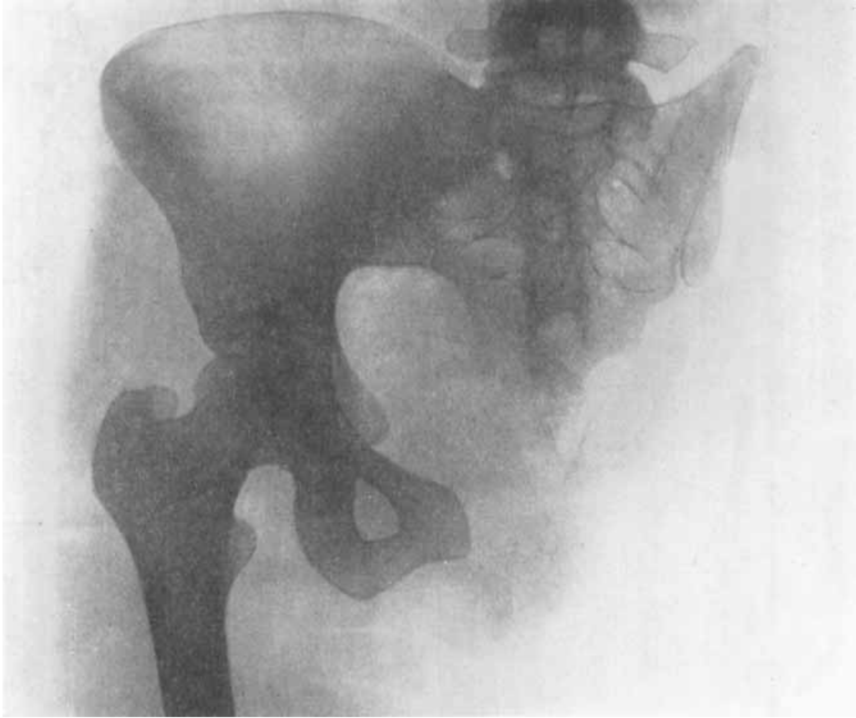


Fig. 6.
Case 1. Six months after operation.

The problem posed by the prosthesis is always the same where weight-bearing, articulated prostheses are concerned. The supporting surfaces of the weight-bearing part, its adjustment and fixation have to be determined and it is on the basis of what can be achieved here that the range of mobility which can be offered by the moving parts of the prosthesis is established.

In hindquarter-amputation it can be accepted as a priori that the most suitable points of support are formed by the remaining part of the pelvis, the skeletal structure of the lower thoracic aperture, and possibly a crutch support in the axilla on the amputation side. The experience which has so far been gained seems, however, to show that the axilla support can be omitted. Generally, therefore, the surgeon can concentrate his attention on constructing a firm girdle or corset to act as the weight-bearing part of the prosthesis. The important points of support then become the remaining half of the pelvis and the arcus costarum. It has been proved, however, that by no means inconsiderable support can also be obtained from what remains of

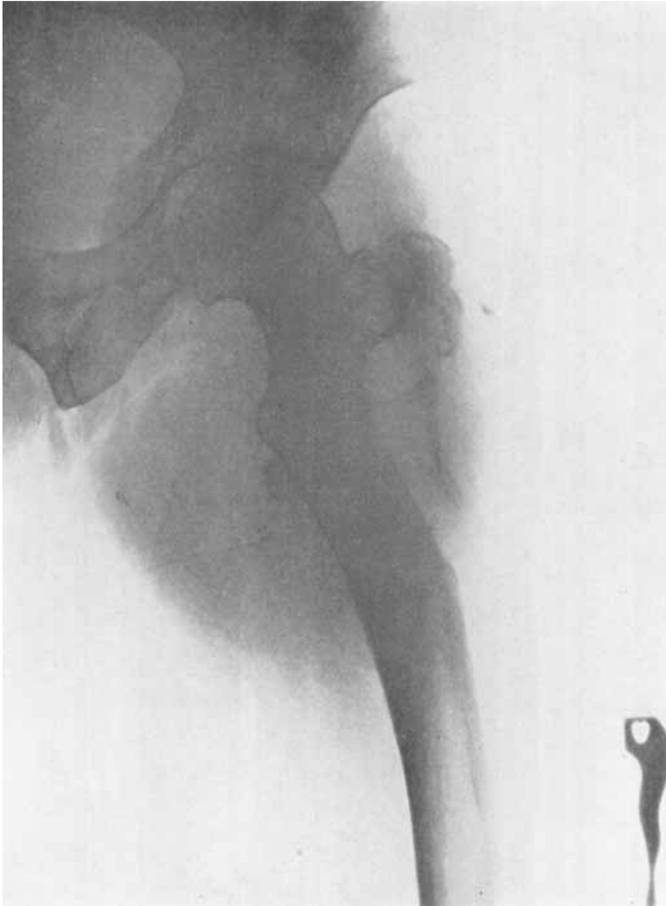


Fig. 7.
Case 2. Before operation.

the amputated half of the pelvis in those cases where it is possible to preserve the glutaeus maximus in reasonable proportions. Thus this provides grounds for the retention of as much of the os ilium as is compatible with the operative technique and satisfactory excision of the tumour. For the same reason exarticulation of the sacro-iliac joint should only be undertaken on quite certain indications since the whole of the glutaeus maximus is excised in this operation. In such cases it is probably necessary to apply a crutch, attached to the corset in order to obtain sufficient support for the weight-bearing part of the prosthesis. (Fig. 3).

On the basis of the stated conditions the cast of the prosthesis is taken as soon as the healing of the wound permits. The moulding

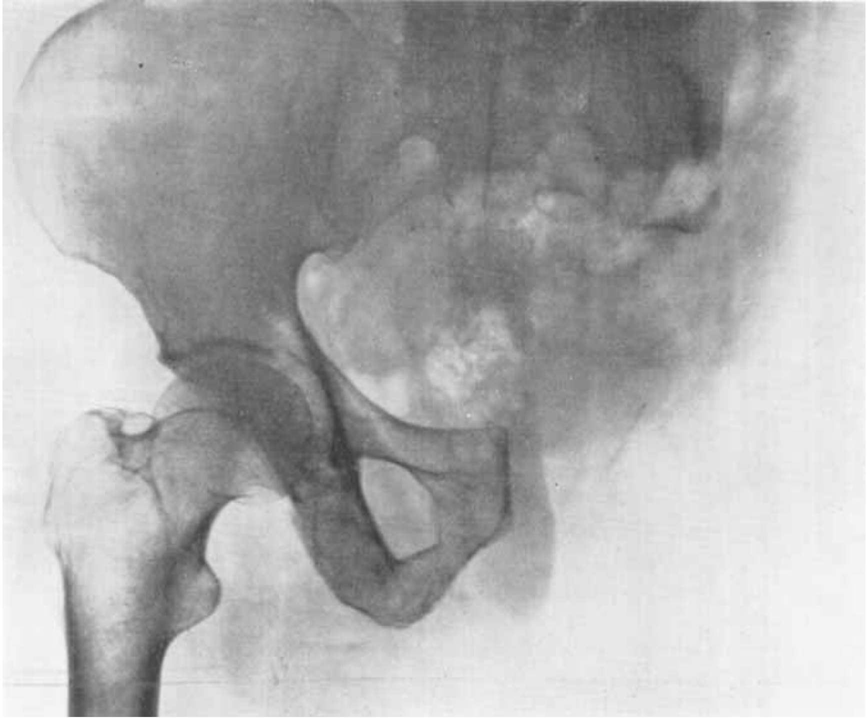


Fig. 8.
Case 2. Three months after operation.

around the remaining ischial tuberosity takes place in the customary manner. Great care is paid to the amputated half of the pelvis and during the moulding a light pressure is applied to the glutaeus maximus where this muscle lies over the remaining part of the os ilium.

After the plaster model has been finished it is dressed in leather and provided with metal splints intended to replace the support of the pelvis girdle for the soft tissues. In addition to these a special splint is applied over the region of the iliac resection. In this way the weight-bearing part of the prosthesis will form a kind of basket or bag with a hole in the bottom for the healthy leg. The shape of the pelvis is restored by means of cork filling which is caudally modelled into a suitable support for the seat. (Fig. 5).

The shaping of the moving parts of the prosthesis leaves place for innumerable individual variations according to the profession, intelligence and age of the patient and it ought therefore to be possible to vary it to some extent from case to case. As a rule the first prosthesis should be made as simple as possible, there should be locking in both

knee and hip joint and flexion is suitably regulated by arresting the dorsal flexion of the foot.

No cases of hindquarter-amputation seem to have been published in Sweden. Two cases of this type have so far been performed at the orthopedical clinic in Lund, both without operative complications.

Case 1. A 35 year old woman. The diagnosis was a malignant giant cell tumour, extending from the collum femoris sinister and encroaching upon the pelvic bones around the acetabulum. Radiological therapy was declared to be hopeless. Resection and the application of an acrylic prosthesis were previously attempted (Fig. 4).

The operation was undertaken 17.3.52. A prosthesis was supplied after three months and the patient was discharged four months after the operation. She could then walk with two trestles indoors.

At the check-up in September 1952, the patient reported that she could manage with one trestle indoors, but that she preferred two, as a rule. (Fig. 5).

No grounds for the anticipation of recurrence or metastases exist. The prognosis is uncertain, but a permanent result ought not to be considered as beyond reach. (Roentgen picture. Fig. 6).

Case 2. A 60 year old man. A large tumour extended from the left collum femoris. On biopsy it was found to be a malignant chondromyxoma. It was declared to be inaccessible to radiological therapy. The extent of the tumour made it impossible to perform an exarticulation in the hip joint with incisions in the healthy tissue. (Fig. 7).

The hindquarter-amputation was carried out 23.7.52. He received his prosthesis after two and a half months. After some hours practice he could already move about indoors with the aid of the trestles. (Roentgen picture. Fig. 8).

Pathological-anatomic investigation of the tumour revealed a chondromyxosarcoma with relatively high differentiation, indicating a low malignity. No metastasis could be determined in the regional lymph glands.

SUMMARY

The author gives a short historical introduction to the hindquarter-amputation operation and then proceeds to report the technique employed in the operation. He discusses the problems relating to the application, adjustment and fixation of prosthesis and finally he describes two cases of hindquarter-amputation without operative complications.

RESUME

L'auteur donne un court aperçu historique de la hemipelvictomiè en rendant compte de la technique opératoire utilisée. Il discute des problèmes relatifs à l'application, à l'ajustement et à la fixation de la prothèse et décrit enfin deux cas d'amputation sans complication opératoire.

ZUSAMMENFASSUNG

Der Verfasser gibt eine kurze Einführung in die Geschichte der interinnomino-abdominalen Amputation und fährt dann fort indem er die Technik des Eingriffes beschreibt. Er bespricht die Probleme der Verwendung, Anpassung und Befestigung der Prothese und beschreibt schliesslich zwei Fälle von interinnomino-abdominaler Amputation die komplikationsfrei verliefen.

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