

*Comments and observations on article entitled "Some Experience in Hemipelvectomy Prosthetics"*  
by *Herbert W. Marx, Prosthetist.*

# Comments and Observations Regarding Hemipelvectomy and Hemipelvectomy Prosthetics

by *Lawrence W. Friedmann, M.D. Director, Medical Services  
Institute for the Crippled and Disabled, New York*

The experience in hemipelvectomy prosthetics at the Institute for the Crippled and Disabled, reported by ICD Prosthetist Herbert W. Marx, describes a method of fabrication which attempts to distribute the forces of standing and walking in such a way that they are spread both in time and space so as not to be uncomfortable or to cause damage to the amputation area.

Hemipelvectomy is one of the most extensive types of amputation known. It is also one of the most serious, inasmuch as the necessity for this ablative procedure is almost invariably a malignant tumor.

Until relatively recently, hemipelvectomy was rarely performed due to the high mortality. The mortality was due not only to the malignancy necessitating the surgery, but also to the poor pre-operative and post-operative care available. The first known successful hemipelvectomy was performed in 1895.

Ariel (Irving M. Ariel, M.D., Bulletin of the Hospital for Joint Diseases, Volume 20, page 37-47, April 1959) states that the indications for hemipelvectomy may be classified as:

1. Primary malignant neoplasms of the innominate bone.
2. Primary malignant neoplasms of the femur which have invaded the hip joint or innominate bone.

3. Cancer of the soft tissues of the upper thigh, buttock or inguinal region, which have invaded the hip joint or extended through to involve the pelvic walls.

4. Metastases to the iliac region, which have infiltrated the hip joint, the pelvic walls, or have extended so as to exclude the possibility of cure by less radical procedures.

5. Massive benign tumors of the innominate bone or the pelvic walls.

6. In certain cases of generalized metastases with severe pain not controlled by other procedures.

7. Certain specific infections and trauma uncontrolled by other procedures. Tuberculosis is a prime example.

The term is used to describe an operation removing the entire lower extremity with its contiguous buttock and most or all of the innominate bone. The present surgical mortality is probably around 10 per cent. Various modifications of the technique, originally described by J. H. Pringel in 1916, have been described. The technique described by Ariel (see above) is presently preferred.

Skin preparation is routine. In cases where the indication for the surgery is a malignancy, it is inadvisable to attempt to squeeze blood out of the lower extremity, in order to avoid the possibility of dislodging tumor cells. A Foley catheter is inserted into the bladder, the anal opening is closed with a purse string suture, and in a male, the scrotum is sutured to the opposite thigh. The incision extends from pubic tubercle laterally, posteriorly, and superiorly to an area about five centimeters superior to the iliac crest, parallel to but above the inguinal ligament. Ariel points out that extending the incision posteriorly should be done

later in the procedure to avoid turning during the surgery more than is necessary. The anterior muscles are detached from the bony pelvis. This includes the rectus abdominis, the obliques, and the inguinal ligament. The spermatic cord is retracted. The peritoneum and the abdominal contents are retracted superiorly and medially. The urinary bladder is retracted medially and inferiorly. The external iliac artery and vein are ligated and divided. The femoral nerve is severed after local anesthetic injection to prevent shock. Delayed ligating the venous return from the leg may require a decrease in the amount of blood transfused, but may increase the spread of malignant emboli.

The pubic symphysis is exposed and divided. The division should be through the symphysis and not through the pubic arch. The quadratus lumborum and levator ani muscles are divided. The sacroiliac joint is exposed from the front. Disarticulation is performed at the sacroiliac joint. Shock due to blood loss may be frequent at this stage.

The patient is turned toward the contralateral side. The incision is then carried posteriorly from the superior margin of the incision down laterally over the buttock. The incision is carried over the buttock to eventually join the inferior border of the anterior incision. The posterior attachment of the gluteal muscles are divided. The sciatic nerve trunk and the ligaments of the sacrum are ligated and severed, as are the obturator and superior gluteal arteries. The lumbo-sacral plexus is transected with a sharp new blade, and permitted to react. The flap is closed after revision and the wound is closed with a drain at each end of the wound.

If it is necessary to ligate the common iliac artery, the posterior flap frequently becomes necrotic. Skin grafting may repair the resultant lesion, but this complicates prosthetic fitting considerably. If the skin has been damaged by radiation therapy for the tumor, this will also tend to make prosthetic use difficult.

Variations of the above technique may involve leaving part of the ilium. This provides another point of fixation which is useful. If the gluteus maximus is sutured to the anterior tissues, this assists with prosthetic force application. If the entire gluteus has been resected, force application in this area is extremely difficult. If the tumor has invaded the skin of the region and an adequate full thickness pericle flap cannot be developed, prosthetic usage is limited, at best.

Normal, sensate, full-thickness skin is needed in order to bear all of the patient's body weight during stance phase. Since the weight of the body must be maintained as a vertical component of forces applied obliquely, shear stresses are considerable.

In order for a patient to utilize this type of prosthesis, it must first be ascertained whether the patient's remaining leg is in good condition. His cardio-respiratory reserve must be equal to the de-

mands to be placed upon him, since the use of this type of prosthesis demands considerable energy expenditure. Frequently it is advisable to let the patient utilize crutches and not fit him with a prosthesis at all, if the patient has no padding from the gluteus maximus and/or has limited weight bearing because of the skin problems mentioned above. Few patients can tolerate all of their weight being supported by the rib cage except for short periods of time. Thus, the hemipelvectomy patient with poor skin at the amputation site is forced to bear weight as does the hemicorporectomy patient. In these cases the use of the wheelchair with a contoured pad to support the pelvis for ease in sitting may be preferable to an attempted sitting with a hemipelvectomy prosthesis. The patient must be looked at as a whole to see whether the criteria for prosthetic prescription have been met, and that significant contradictions to prosthetic usage do not exist.