Hip Joint Communication with Pressure Sore: The Refractory Wound and the Role of Girdlestone Arthroplasty

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Fifteen patients who underwent Girdlestone arthroplasty (proximal femoral head resection) were reviewed at The Johns Hopkins Hospital and Northwestern Memorial Hospital. Ages ranged from 24 to 57 years (mean 36.7 years). All patients were paraplegics or quadriplegics (C7-L3). All patients presented with signs of sepsis and had evidence of osteomyelitis. Soft-tissue reconstruction was most commonly performed with the vastus lateralis, and no femoral stabilization was used. There were no deaths. Recurrent ulcers at the site of the Girdlestone arthroplasty were found in 23 percent of patients in whom follow-up was possible. No recurrence was noted at the original site in 77 percent with a mean follow-up of 20 months. Additional pressure sores occurred at other nonsurgical sites in six patients at a mean of 23.3 months. Girdlestone arthroplasty with soft-tissue coverage is mandatory for successful treatment of pressure sores with hip joint involvement. (Plast. Reconstr. Surg. 91: 288, 1993.)

The medical and economic demands that pressure sores place on the health care system are astounding. It has been suggested that 17 percent of hospitalized patients have or are at risk of developing pressure sores.1 Although not all these patients are operative candidates, surgical treatment for pressure sores began with Davis2 in 1938. He advanced the concept of using flap replacement of scar epithelium in healed ulcers to provide bulk and padding over bony prominences. Surgical treatment, however, is fraught with recurrence, poor nutritional status, anemia, transfusions, and inherent complications of the pressure sore. One such inherent complication is hip joint communication with ischial or trochan
teric pressure sores. The diagnosis of hip involvement can be difficult and is frequently missed. Inadequate treatment of the osteomyelitis and pyarthrosis almost certainly causes reconstructive failure, leading to persistent infections, flap breakdown, and draining sinuses. Girdlestone arthroplasty (proximal femoral neck resection) has been well documented as an option for the treatment of septic hips.3-13 Combined with soft-tissue closure, control of the septic hip has been maintained.14-16 This combined therapy of proximal femoral resection and soft-tissue coverage has been used at The Johns Hopkins Hospital and Northwestern Memorial Hospital for posterolateral pressure sores with hip joint communications. It is the belief that when the combined approach is used, the incidence of wound recurrence, repeated infections, and draining sinus tracts can be minimized. It is the purpose of this retrospective study to evaluate the efficiency of this combined treatment modality in both institutions.

Patients and Methods

A retrospective analysis of 15 patients who underwent proximal femoral resection for control of pressure sores with hip joint communication was reviewed. The data included all patients who had this procedure between 1979 and 1990 at Northwestern Memorial Hospital and between 1985 and 1990 at The Johns Hopkins

Hospital. There were 12 men and 3 women, with ages ranging from 24 to 57 years (mean 36.7 years).

All patients were paraplegics or quadriplegics. Paralysis level ranged from C7 to L3. The average duration of paralysis to the time of proximal femoral resection was 12 years, ranging from 1 to 33 years. All patients presented with signs of sepsis. This included fever, chills, nausea, and/or vomiting. A leukocytosis and/or bandemia also was present in all patients. All patients had evidence of pyarthrosis. This was diagnosed preoperatively by radiographic means in five patients. An arthrogram was obtained in one preoperative radiographic analysis, revealing communication with the joint. Intraoperative diagnosis of pyarthrosis was made in nine patients at the time of Girdlestone arthroplasty. Joint opening was identified and palpable in four of these nine patients. Postoperative pathologic evaluation of bone for osteomyelitis diagnosed pyarthrosis exclusively in one patient.

Ten patients (67 percent) underwent prior operative attempted flap closure for pressure sores before proximal femoral resection. Failure was seen in 100 percent of these patients. Hip joint communication had not been appreciated in these 10 patients prior to attempted flap closure.

All 15 patients presented with a cumulative ulcer prevalence of 40. Distribution included 20 trochanteric, 12 ischial, and 8 sacral ulcers (Fig. 1).

**TREATMENT**

Proximal femoral resection was performed on the left side in six and the right in nine. Soft-tissue closure was performed immediately after proximal femoral resection in nine or delayed in six up to 5 months in duration. Delay was performed primarily for control of sepsis. Soft-tissue coverage was used for joint obliteration and skin defects. The vastus lateralis was most commonly used for soft-tissue coverage (40 percent) (Fig. 2). The tensor fasciae latae V-Y retroposition advancement flap was performed in 33 percent. Posterior thigh or rectus femoris flaps were used in 20 percent. A split-thickness skin graft, an anterior thigh advancement flap, a rectus abdominis flap, a biceps femoris flap, a bipedicled flap, and a total leg flap also were used. Nine patients had two different types of soft-tissue coverage used for reconstruction or joint ablation (Table I). No patient received external stabilization of the distal femur after proximal resection. There were no incidences of ischemia secondary to femoral artery occlusion or injury. The acetabulum in each case was cleaned of all remaining cartilage until viable bone was present. If infection could not be eradicated, delayed soft-tissue coverage was performed. Culture-sensitive antibiotics were used until signs of sepsis had abated. Closed suction drainage was used in each patient. Drains were discontinued when outputs had markedly decreased. Routine cultures of the drainage fluid were not performed unless sepsis did not resolve.

![Fig. 1. Ulcer distribution.](image1)

![Fig. 2. Diagram depicting resection of the proximal femur and coverage with the vastus lateralis.](image2)
TABLE I
Soft Tissue Used

<table>
<thead>
<tr>
<th>Tissue Used</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vastus lateralis</td>
<td>6</td>
</tr>
<tr>
<td>Tensor fasciae latae V-Y retroposi-</td>
<td>5</td>
</tr>
<tr>
<td>tion advancement</td>
<td></td>
</tr>
<tr>
<td>Posterior thigh</td>
<td>3</td>
</tr>
<tr>
<td>Rectus femoris</td>
<td>3</td>
</tr>
<tr>
<td>Split-thickness skin graft (muscle</td>
<td>2</td>
</tr>
<tr>
<td>coverage, 1; joint coverage, 1)</td>
<td></td>
</tr>
<tr>
<td>Anterior thigh advancement</td>
<td>1</td>
</tr>
<tr>
<td>Total leg</td>
<td>1</td>
</tr>
<tr>
<td>Rectus abdominis</td>
<td>1</td>
</tr>
<tr>
<td>Biceps femoris</td>
<td>1</td>
</tr>
<tr>
<td>Bipedicle</td>
<td>1</td>
</tr>
</tbody>
</table>

RESULTS

Cultures were obtained from all 15 patients. When possible, bone was sent for culture evaluation. However, no bone biopsies for culture determination were performed before Girdlestone arthroplasty. *Staphylococcus aureus* was most commonly a bacterial pathogen, in 47 percent. *Streptococcus* group D, *Proteus*, and *Streptococcus* group A also were isolated (33 percent). *Escherichia coli*, *Pseudomonas*, *Acinetobacter*, and *Bacteroides fragilis* also were cultured (Table II).

The most common postreconstructive complication was seroma formation (13 percent). Instillation of tetracycline was used in one patient in an attempt to obliterate dead space secondary to this seroma accumulation. A further operative procedure with readvancement of muscle coverage was, however, required. Deep venous thrombosis with flap loss, hematoma formation, partial flap dehiscence, persistent drainage, and a medial knee pressure ulcer due to internal rotation of the lower extremity after proximal femoral resection were all noted once (Table III). No injury to the femoral vessels was seen.

Follow-up was obtained on 13 of 15 patients. Follow-up ranged from 2 to 48 months, with a mean of 20 months. Criteria for the end point of follow-up was ulcer recurrence or the date the patient was last evaluated without recurrence. The distribution of follow-up on these 13 patients is as follows: Three patients had recurrence or were last seen without recurrence between 2 and 6 months after correction of their septic hips and pressure sores. Four patients were distributed between 7 and 12 months, one between 13 and 18 months, two between 31 and 36 months, two between 37 and 42 months, and one at 48 months. All patients had healed wounds upon discharge from the hospital. Recurrent ulcers at the site of proximal femoral resection were noted in three patients (23 percent). Recurrence occurred in these three patients at 6, 36, and 48 months. Recurrence was noted in immediate soft-tissue reconstruction in two patients and in delayed soft-tissue reconstruction in one patient. No recurrence was noted in 10 of 13 patients (77 percent) at the site of proximal femoral resection. Six of these 13 patients had recurrent ulcers at a site other than proximal femoral resection at an average of 23.3 months (Table IV and Fig. 3). It appears that altered body mechanics may have played a role in the development of these ulcers away from our surgical site after proximal femoral resection in two patients (33 percent).

Heterotrophic bone formation was noted in 46 percent of patients postoperatively. In one patient, heterotopic bone formation, along with recurrent ulcers at a different site, led to further femoral resection and a total leg flap for coverage. It should be noted that no ulcer had recurred at this original site prior to this procedure.

There were no deaths among our study patients despite their septic presentations on admission. Ablation of the joint space was performed if all gross infection could be removed.
If this was not possible, delayed soft-tissue coverage was performed.

**DISCUSSION**

In 1943, G. R. Girdlestone, then the Nuffield Professor of Orthopaedic Surgery at Oxford, proposed an operation that would give free access and effective drainage to acute pyogenic arthritis of the hip. The proximal femoral resection has evolved into a procedure that provides a means of joint salvage, permitting motion and relief of pain. It also may offer an alternative procedure to the treatment of hip pyarthrosis by total hip disarticulation.

Trochanteric/ischial pressure sores, although not frequently associated with pyarthrosis of the hip, can cause debilitating illness. The incidence of hip joint communication with these pressure ulcers is currently unknown. Proximal femoral resection with soft-tissue coverage may offer the only definitive treatment option for pressure sores with hip joint communication short of total hip disarticulation. To answer this question, 15 patients were retrospectively reviewed at two institutions. There were 6 patients from The Johns Hopkins Hospital and 9 from Northwestern Memorial Hospital.

The diagnosis of hip joint involvement is difficult. Missed osteomyelitis of the joint is common and usually presents with failed soft-tissue coverage. All the study patients presented with signs of sepsis. These included persistent spiking fevers resolving with antibiotics but recurring despite adequate open drainage of a presumed septic focus. A septic joint should be suspected when encountering a patient with recurrent trochanteric/ischial pressure sores, a septic presentation, and persistent drainage. The diagnosis, although difficult, can be made if pyarthrosis is sought. Arthograms occasionally may be obtained by cannulation of sinus tracts. Contrast media within the joint space confirm hip joint communication, but fluid may not always be flushed into the joint during this study. Physical examination and alternative radiographic studies (described below) have been more reliable in the diagnosis. In addition, there is a reluctance to introduce a needle through a trochanteric/ischial pressure sore for fear of contamination if the joint is intact. An arthrogram was obtained in one patient. Radiographic analysis with magnified “coned down” views of the joint may reveal bony erosion of the joint surface consistent with osteomyelitis. This occurred in five of our patients. Palpation also may detect a large communication and was seen in four of our patients. Despite these studies, the clinical presentation of a septic patient with a draining trochanteric/ischial pressure sore appears the most reliable indicator of hip joint communication.

Proximal femoral resection was performed in all patients, followed by immediate or delayed soft-tissue coverage. Lateral incisions over the proximal femur with ulcer excision were used to obtain exposure for the Girdlestone procedure. Prior flap coverage did not alter our approach.
significantly. Several studies have shown success in treatment with soft-tissue coverage after proximal femoral resection for septic pyarthrosis.\textsuperscript{14–16} Frequently, the soft-tissue defect and dead-space obliteration were large enough to require two different types of soft-tissue coverage. This occurred in nine patients, and there appeared to be no increase in complications related to immediate or delayed soft-tissue coverage. Delay was necessary because of sepsis and bacterial contamination. All cartilage was removed from the acetabulum prior to soft-tissue coverage. Viable bone is necessary if success is to occur.

No patient in our study received external stabilization. Seroma formation was present in two patients, and the development of a medial knee ulcer occurred in one. We believe that seroma formation was due to inadequate drainage or resection or increased dead space. We do not believe, as other authors have noted,\textsuperscript{15,16} that external stabilization would have decreased
plasty and soft-tissue coverage are efficacious, not simply relying on short-term evaluation. Recurrence was seen in immediate soft-tissue coverage in two patients and in delayed coverage in one patient. The numbers are too small to draw any conclusions; however, there may be an advantage to delay soft-tissue coverage if wounds are significantly contaminated. No recurrence was noted in 10 of our patients (77 percent). This supports the work by Mathes and associates showing improved success of infection control with the use of muscle flaps. Recurrence at another site separate from the proximal femoral resection (46 percent) was attributable to altered body mechanics in two patients. Alteration of body mechanics is not surprising, when one considers the variation in balance created by proximal femoral resection. This overall recurrence is consistent with the general overall rate in the pressure sore patient. Muscle spasms did not appear to be a factor in recurrence. This is due to the muscular bulk and the absence of tension used in the closure.

Heterotrophic bone formation occurred in six patients. In one of our patients, recurrent ulcers at a different site from our proximal femoral resection, along with extensive heterotrophic bone formation, led to femoral removal and a total leg flap. No recurrent ulcers at the site of proximal femoral resection were noted in this patient prior to his leg flap. It is imperative that all heterotrophic bone be removed prior to soft-tissue coverage. Inadequate debridement is fraught with complications.

From these data we can state that proximal

these complications. The absence of external fixation did not appear to have an adverse effect on flap viability or wound healing. No patient developed urinary fistulas.

Chronic osteomyelitis is common in these patients, and bone biopsy with culture evaluation and preoperative antibiotics may be beneficial in this patient group. They also may allow more immediate soft-tissue closure after Girdlestone arthroplasty by decreasing the amount of infection preoperatively.

No patient died in our study. Recurrent ulcers at the site of the proximal femoral resection were noted in three patients (23 percent). Two of these three were noncompliant with therapy. Their recurrence was seen at 6 and 36 months, respectively. Another presented with superficial ulcers at the trochanteric/ischial sites 48 months after surgical correction. These subsequently healed with dressing changes alone. The distribution of follow-up is varied. This supports the contention of the study that Girdlestone arthro-

Fig. 5. Appearance 6 months later, revealing heterotrophic bone formation.

Fig. 6. CT scan of the pelvis revealing heterotrophic bone formation; no recurrent ulcer at the site of the Girdlestone resection.
femoral resection with soft-tissue coverage is the definitive treatment option for pressure sores with hip joint communication. Diagnosis is often difficult but should be suspected in patients presenting in sepsis with recurrent trochanteric/ischial pressure sores. Arthograms, radiographic “coned down” views, nucleotide scans, and palpation of the joint are all helpful in further delineating joint involvement. Their sensitivity, however, is often poor. Clinical suspicion and presenting symptoms of sepsis and a draining posterior lateral pressure sore are the “gold standards” for diagnosis. Without treatment of the joint communication and underlying osteomyelitis, surgical options are doomed to failure.

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REFERENCES