Incisional cellulitis after total hip replacement
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We report 16 cases of erythematous eruption on the skin within the flaps of the surgical incision after primary total hip replacement over an eight-year period. The symptoms began within nine months of operation in 13 hips, and two to three years after in three. Four patients had recurrent episodes. All were treated with antibiotics (15 intravenous, one oral) with complete resolution of the eruption within one to six days. The mean follow-up after the last episode of cellulitis was 27 months (14 to 76). There were no cases of periprosthetic sepsis or other sequelae.

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Cellulitis is rare after hip surgery. To our knowledge there is only one report of its occurrence after fixation of a fracture about the hip and none after hip replacement. In patients with total hip replacement (THR) the concerns of local and haematogenous spread of infection are heightened by the potential threat of periprosthetic involvement. We describe our experience over an eight-year period of 16 hips which had a cellulitis-like eruption in the area of the incision after THR.

Patients and Methods
From 1988 to 1996 two of us (CSR, JAR) performed 2200 THRs and encountered 16 cases of an acute erythematous eruption of the skin within the flaps around the incision in 14 patients after primary THR. Four hips had cement fixation, four were hybrids and eight were uncemented. All patients had uncomplicated wound healing. There were ten men and four women with a mean age of 64 years (44 to 84).

We used a posterior approach in all patients. A Charnley retractor was initially employed on the skin with a broad stainless-steel femoral retractor against the posterior flap to deliver the proximal femur laterally. Closure consisted of three braided, non-absorbable tagging sutures in the fascia, vicryl in the subcutaneous tissue, with a nylon cuticular stitch. The skin suture was removed between seven and 14 days after surgery.

All the patients had a spontaneous onset of an erythematous papular skin eruption in the wound flaps (Fig. 1). Initially, all the eruptions were in the posterior flap and gluteal region with 14 hips having anterior extension (Fig. 2).

Symptoms began within nine months of operation (three weeks to nine months) in 13 hips (11 patients) and two to three years after surgery in the others (three patients). Two patients had had bilateral THRs and developed erythema on both sides simultaneously. One had received bilateral THRs one year apart and developed symptoms around the first hip by six weeks after operation and on the second side three weeks after the procedure. Four patients (four hips) had recurrent episodes; three hips had two episodes at one and five months apart, and one three episodes at two weeks, three weeks and six months apart. None of the patients had any recent infection, local skin abrasions or dental manipulation within three months of the onset of symptoms.

All but one were admitted to hospital, given intravenous antibiotics and assessed by haematological investigations, radiography, radionucleide scanning, blood culture (n = 11), aspiration from the area (n = 6) and skin biopsy (n = 3). Eleven patients had intravenous cephalaxin, one vancomycin, one ampicillin and gentamicin, and one cefuroxime for a period of two to six days until the erythema had resolved. Cephalaxin, ciprofloxacin or amoxicillin was then given orally for two to six weeks. One patient received only oral ciprofloxacin with resolution of the erythema within 24 hours. The mean follow-up after the last episode of cellulitis was 27 months (14 to 76).

Results
Seven of the 21 episodes (five recurrent) were associated with low-grade fever (<38°C) or chills. The mean WBC...
count was 9.8 (6.2 to 16.5) × 1000 cells/µl but there were six instances in which it was above 10.5 (11.8, 11.9, 12, 12.3, 16.5), all with a normal differential count. The mean ESR was 20 mm/hour (5 to 61).

Radiographs showed no change when compared with the previous film, with no evidence of periostitis. Radiolabelled scanning revealed no abnormality in any patient in the phase-III images and showed soft-tissue pooling in phases I and II in three cases. Blood cultures were all negative (n = 11). Aspiration revealed group-B Streptococcus in one patient, and Klebsiella pneumoniae as well as Pseudomonas in another. The other four aspirates did not grow organisms on culture. Skin biopsy from three patients showed mostly resolving inflammation, and one case of an urticarial reaction which was possibly allergic.

All patients had complete resolution of the eruption within one to six days. At the most recent follow-up the hip replacements continued to function well with no clinical or radiological evidence to suggest infection. All four patients with recurrences have been followed for at least 16 months from the last episode without additional difficulty.

Discussion

Cellulitis after THR is exceedingly uncommon. In our experience, we have encountered this in only 16 out of a total of 2200 THRs in eight years. All the patients had a similar onset and appearance of the skin eruption which began at the posterior skin flap and spread radially. Systemic signs or symptoms were uncommon.

The cause is unclear. None of the patients had any predisposing factors for bacteraemia, such as other infections or recent skin lesions, although two had a history of psoriasis. Mainetti et al\textsuperscript{1} have reported cellulitis after internal fixation using a dynamic hip screw. They suggest that the compromise of the venous and lymphatic circulation around the skin flaps may have been responsible. The superficial lymph vessels of the gluteal region circle anteriorly to drain into the superficial inguinal nodes, and these are severed by the posterolateral skin incision.\textsuperscript{2} The use of a large metallic retractor to elevate the femur places considerable compression on the skin and subcutaneous tissue of the posterior flap. Small fragments of metal may remain in these tissues after irrigation, serving as a nidus.

It is less likely that this entity is an allergic response or some other form of subcutaneous inflammation. Stierstorfer and Clendenning\textsuperscript{3} described a case in which skin biopsy showed features of eosinophilic cellulitis, a form of dermatitis. Starn et al\textsuperscript{4} reported delayed cellulitis after breast lumpectomy, node dissection and local irradiation in ten patients. In five this resolved promptly after treatment with antibiotics, while five were treated with anti-inflammatory agents or observation with gradual resolution, suggesting that this was a chronic inflammatory condition.

In a series of 259 culture-positive cases of cellulitis, Brook and Frazier\textsuperscript{5} noted a regional variability in the infecting flora. Of 15 cases in the buttocks, aerobic organisms were isolated in only two, while ten had only anaerobic organisms and three had both. Polymicrobial infections

Figure 1 – Photograph of a 65-year-old man in whom eruption occurred three months after a THR. It resolved completely within 48 hours of starting treatment with antibiotics. Figure 2 – In this patient the symptoms first appeared three months after operation and recurred four months later. In both cases, there was complete rapid resolution and no further symptoms in seven years.
were common, with seven isolates of *Staphylococcus* and *Streptococcus*, five of Gram-negative organisms and 17 of anaerobic organisms, mostly *Bacteroides* and *Peptostreptococcus*. They recommended that initial treatment with antibiotics should be broad to include not only Gram-positive, but also Gram-negative and anaerobic organisms.

Because of the risk of haematogenous spread of bacteria in a recently implanted hip replacement, our treatment has been aggressive with immediate institution of intravenous antibiotic therapy in most cases. In our series, two out of six cultures were positive, one with a single isolate and one with two aerobic organisms. Every patient had resolution of the eruption within the first six days of treatment. Although there were four cases of recurrence, these patients also responded to the same antibiotic treatment, and remain free from symptoms at the most recent follow-up. Most importantly, incisional cellulitis does not represent an underlying prosthetic infection and did not lead to infectious sequelae in any patient.

We conclude that incisional cellulitis after THR is a clinical entity with acute onset and rapid progression. Treatment with antibiotics leads to rapid resolution of the symptoms and we recommend at least a two-week course of antibiotics. Recurrences may occur, but they also respond rapidly to antibiotic treatment. There were no cases of prosthetic infection or other sequelae.

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References