LATE COMPLICATIONS OF TOTAL HIP REPLACEMENT FROM BONE CEMENT WITHIN THE PELVIS

A REVIEW OF THE LITERATURE AND A CASE REPORT INVOLVING DYSPAREUNIA

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It is not uncommon to observe bone cement in the pelvis on radiographs after total hip replacement, a finding which is generally considered to be benign. This paper reviews some catastrophic late complications from intrapelvic methylmethacrylate. We also describe a case of progressive, unbearable dyspareunia beginning three years after total hip replacement. A possible explanation of the pathophysiology is suggested.

Recommendations for prevention, diagnosis, and treatment of these late complications are offered.

Total hip replacement is a well established surgical procedure of which an estimated 75,000 are performed annually in the United States alone (Consensus Development Panel 1982). The procedure has a number of recognised complications including loosening, perarticular ossification, sepsis, prosthetic failure, and dislocation (Amstutz 1970; Mallory 1972; Eftekhar, Kiernan and Stinchfield 1976; Hallet, Salvati and Botero 1976; Lowell 1978). The use of polymethylmethacrylate ("cement") increased the success rate and reduced the complications of total replacement, but contributed to certain technical problems and complications (Charnley 1979).

While preparing the acetabulum for fixation of the prosthesis, the medial acetabular wall may be perforated, either deliberately or accidentally. If this is recognised at the time, appropriate measures can be taken to prevent cement intruding into the pelvis. But if perforation is not recognised, the cement may herniate into the pelvis (Markolf and Amstutz 1976; Weinstein et al. 1976). Soon after operation, this may cause pain or interference with the function of the muscles controlling the hip, particularly the iliopsoas. Delayed problems attributable to intrapelvic cement include vascular or nerve damage (Dorr et al. 1974; Scullin, Nelson and Beven 1975; Hirsch, Robertson and Gorniowsky 1976; Aust, Bredenberg and Murray 1981), injury to the colon (Switzer, Cooperberg and Knickerbocker 1974), and obstruction of the small bowel (Michel and Haskell 1977) or other viscera (Casagrande and Danahy 1971).

Complications attributable to intrapelvic cement may also involve the pelvic genito-urinary organs. Early features then include gross haematuria (Greenspan and Norman 1978) and late complications include bladder fistula (Lowell, Davies and Bennett 1975; Frazier and Edelbrock 1980). Evanski, Waugh and Orofino (1973) also mentioned dyspareunia after revision arthroplasty. This present paper reviews the late complications of total hip replacement due to intrapelvic bone cement, and describes a case of dyspareunia developing three years after operation; it also makes recommendations for prevention, diagnosis and treatment of these late complications.

CASE REPORT

A 27-year-old female complaining of dyspareunia for both herself and her sexual partner was referred by the physician managing her sickle-cell disease. Thirty-nine months before admission she had, at another hospital, undergone a left Charnley–Müller total hip replacement for painful avascular necrosis. She experienced no difficulty immediately after operation; walking and intercourse were both quite painless until 34 months later. Then, five months before her admission, she began to notice pain with intercourse. One month later she developed a vaginal discharge and pain when she inserted tampons. Concomitantly, she was treated for a Bartholin abscess, the infection settling within a week. The dyspareunia, however, continued; initially she merely felt a dull pain, but gradually it became quite sharp in nature. Her sexual partner also experienced discomfort during intercourse over the same period of time. His discomfort also was initially dull in nature, but gradually
progressed to being "knife-like". Eventually they had to refrain from intercourse. The patient also described an uncomfortable sensation in the left lower quadrant of her abdomen and groin for two months before admission. She had no pain or other symptoms referable to the left hip.

On examination, the patient walked with no detectable limp. The affected hip (the left) had a range of flexion of 0 to 90°, with pain in the left groin; abduction was 35°, adduction 20°, lateral rotation in flexion 20° and in extension 0° (both with pain), medial rotation in flexion was 30°, and in extension 40°. The incision was well healed and was not tender. Abdominal examination elicited mild tenderness in the left lower quadrant but no mass could be felt. On pelvic examination the vaginal vault and the cervix looked normal. Bimanual examination, however, revealed a firm fixed mass in the left adnexal region abutting closely against the lateral vaginal wall at the level of the cervical os. Palpation of the mass reproduced the patient's excruciating pain.

Radiographs of the pelvis revealed an intrapelvic mass of bone cement protruding from the region of the left acetabulum at the level of the superior pubic ramus (Figs 1 and 2).


As soon as the patient was fit the pelvis was explored under spinal anaesthesia. A Pfannenstiel incision was used to approach the space of Retzius. The mass of cement was identified abutting the vaginal wall as a "spike". It was completely covered by soft tissue which at the tip of the spike was very thin. The vaginal wall, bladder and surrounding structures appeared intact and there was no evidence of perforation or fistula formation. The mass of cement was dissected free of the iliopectoas muscle and was removed with the aid of a curved osteotome. The medial pelvic cortical defect through which it had migrated was estimated to be only 8 × 4 mm; the mass itself measured 35 × 30 mm. A single, sharp projection about 5 mm in size had been abutting against the vaginal wall (Fig. 3).

After operation the patient had prompt relief of the left lower quadrant abdominal pain. Radiographs showed that the mass of cement had indeed been removed (Fig. 4). Pelvic examination after two months was painless and the patient had resumed intercourse without discomfort to herself or her partner.

At 18 months she was still free of pain and as active

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**Fig. 1**
Radiographs three years after total hip replacement of the left hip showing intrapelvic polymethylmethacrylate. Note the radiolucent line at the lateral bone-cement interface of the femoral component. Figure 1—Anteroposterior view. Figure 2—Lateral view.
as her sickle-cell disease would permit. Walking was comfortable, there was no dyspareunia and no evidence of gynaecological infection. The left hip had painless flexion of 0 to 120°, 45° of abduction, 35° of adduction, 60° of lateral rotation in flexion, and 30° of medial rotation. Pelvic examination revealed no abnormalities and the radiographs remained unchanged from those obtained soon after the operation.

DISCUSSION

In total hip replacement adequate medial placement of the acetabulum is desirable (Charnley 1970; Charnley 1979). In accomplishing this, penetration of the medial pelvic wall may occur. Cement is then inserted into the acetabulum under pressure. If the cement contains barium it is not uncommon to see it lying in the pelvis on the postoperative radiographs; here it may be associated with late complications. Greenspan and Norman (1978) reported four cases of gross haematuria developing more than one week after operation. Casagrande and Danahy (1971) reported delayed sciatic nerve irritation. Michel and Haskell (1977) described small bowel obstruction caused by adhesions about a bolus of cement. Aust et al. (1981) implicated intrapelvic cement in the late development of a false aneurysm of the external iliac artery. Lowell et al. (1975) described a case of bladder fistula that was diagnosed more than a year after operation. Frazier and Edelbrock (1980) reported a sinus connecting the bladder with the hip and thigh. Evanski et al. (1973) mentioned dyspareunia after revision of a mould arthroplasty. All authors attributed heat necrosis of the pelvic tissues with subsequent fibrosis and contracture as the cause of these late complications.

It is well known that the exothermic reaction of hardening acrylic may damage adjacent tissues (Charnley 1970; Wilson et al. 1972; Hirsch et al. 1976; Consensus Development Panel 1982). Most of this damage occurs immediately. Charnley (1979), describing the histology of the late reaction to cement, wrote that the "...cement was frequently covered with a layer of amorphous, caseous debris". Concern has also been expressed as to whether degradation of cement with time might lead to adverse interactions with the adjacent soft tissues (Consensus Development Panel 1982). Despite this the possibility of late complications caused by tissue reaction at the interface of cement and soft tissues, independent of perioperative thermal necrosis, has not been delineated.

In our patient symptoms did not begin until almost three years after operation. The pain was initially mild and dull, but became progressively severe and sharp. We speculate that the late onset and the progressive nature of the symptoms may be attributed to thinning and erosion of soft tissues adjacent to the cement. The patient’s general level of activity, the stresses of sexual intercourse and the use of tampons could all contribute to mechanical thinning of the tissues over the rigid foreign body; the fact that pain developed late and increased gradually suggests progressive thinning and certainly the vaginal wall was extremely thin at operation.

Gradual erosion of tissues may account for some of the late complications reported previously. For example, Frazier and Edelbrock (1980) reported a case in which they presumed that infection spread via a fistula from the hip into the bladder. Lowell et al. (1975) also reported a bladder fistula and Camer (1982) treated two patients with arthrovesical fistulae in whom cement extruded from an acetabular defect had impinged on the bladder. Camer also described other patients with "impingement on the rectum and vagina with a palpable mass on digital examination"; these were associated with intrapelvic herniation of cement that had initially appeared to be innocuous. Soft-tissue thinning or erosion from mechanical pressure may lead to perforation or fistula formation, even in the absence of infection. Since this would provide direct communication with the arthroplasty components, the consequences could be serious and infection could then spread from the bladder to the hip.

Currently advocated methods of high pressure, instrument-assisted insertion of cement and the use of low-viscosity acrylics increase the possibility of introducing cement into the pelvis. Care is needed when preparing the bone (Amstutz 1970; Charnley 1970; Wilson et al. 1972) and the prepared acetabulum must be carefully inspected before the cement is introduced. If perforation of the medial acetabular wall is recognised, then wire restricters or cancellous bone grafts should be placed to prevent intrusion of cement into the pelvis; this also assists pressurisation.

Herniation of cement into the pelvis has frequently been observed on postoperative radiographs and has been considered benign (Greenspan and Norman 1978);
the iliopsoas muscle is usually thought to afford protection. Indeed, Greenspan and Norman (1978), although they advised being alert to the intrapelvic cement, felt that the associated problems were mild and that treatment should be symptomatic. However, the possibility of late complications due to soft tissue erosion should not be dismissed lightly. The presence of any intrapelvic cement in the postoperative radiographs should be carefully noted; if symptoms referable to the pelvic or visceral organs subsequently develop, then timely evaluation and appropriate treatment is imperative. We believe that pain associated with intrapelvic cement, particularly progressive pain, is a strong indication for excision of the cement. Excision before a fistula forms will hopefully prevent infection.

In our patient the degree of thinning of soft tissues within the pelvis discovered at the time of operation was alarming and we were fortunate to be able to excise the mass before a fistula or major infection developed. Bone cement within the pelvis should be recognized as a potential cause of late complications of hip replacement; when a patient presents with symptoms prompt diagnosis and treatment should yield excellent results and avoid possibly catastrophic complications.

REFERENCES