TECHNICAL NOTE

Novel technique of preparing articulated hip spacers- technical note

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Introduction: Articulated hip spacers play important role in two staged revision of infected THR. Various techniques are available to make these spacers. Pre formed spacers are available but are expensive. Other authors have reported use of Steinman pin, rubber bulb of irrigation syringe[1], rush pins [2], k-nail[3] and intramedullary rods[3] to make these spacers. These are limited by roughness of the surface, uneven cement mantle, pain, crepitus, restriction of movement. Use of an antibiotic-impregnated articulated cement spacer permits early patient mobilization, delivers local antibiotics, maintains leg length, and facilitates exposure during the second-stage reimplantation operation.[4,5,3,7,6] It optimises the soft tissue tension during the interval period which facilitates rehabilitation of the patient in the interval period and also help in exposure during reimplantation surgery.[4] Maintenance of limb length avoids contracture of soft tissues and also prevents the extensive soft tissue resection [anterior and posterior] which is otherwise required to get the greater trochanter down. This in turn facilitates faster rehabilitation during surgery. We made indigenous two part cement spacer moulds to fabricate these articulated spacers on a customised stem.

Technique. Patient is positioned in true lateral position, affected lower limb is painted and draped. Posterolateral skin incision is marked from the posterior border of the greater trochanter passing distally across the shaft of femur and proximally extending around four fingers proximal to the greater trochanter in the same line [fig2a]. Skin and subcutaneous tissue are cut and haemostasis achieved. Tensor fascia lata is cut in the line of incision, fibres of gluteus maximus were split using a cautery. Gluteus maximus is cut from its attachment to the femur. This provides larger exposure with smaller skin incision and also avoids sciatic nerve compression in case limb traction is required [fig2b]. Self retaining Charnley's retractor is then applied to retract the tissues.

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Normally in these infected cases the plane between the short rotators is difficult to appreciate. The best technique is to expose the joint by cutting flush to the bone of proximal femur and dissecting it towards the pyriformis fossa[fig2c]. The capsule as well as the short external rotators is cut enmasse to expose the joint. The hip joint is dislocated and removal of prosthesis is done. Usually with infection the components are loose and come out easily. In cases with cemented prosthesis, care has to be taken to remove the entire cement mantle across the neck particularly in the greater trochanter area around the shoulder of the prosthesis. Acetabulum is exposed through following steps. All the infected and nonviable tissues and fibrosis are excised. Capsule at the anterior rim of acetabulum is incised and a retractor is placed on the anterior rim of acetabulum thus retracting the entire femoral shaft. The entire soft tissue around the acetabular labrum is excised and posterior soft tissues are retracted and held by means of a Steinman pin inserted into the ischial tuberosity. The transverse acetabular ligament is palpated and fibrosis inferior to the ligament is cleared to make space for inferior spike to be placed there. This provides a 360^0 view of acetabulum. The acetabular floor is cleared of the non viable tissue using curette. Sequential reaming of acetabulum is done till bleeding subchondral bone is reached [fig3]. The highest size of reamer decides the size of the mould femoral head and a size smaller than the largest reamer is selected. Femoral canal is scraped with a long curette and reamed to remove the

Figure 1 - pre-operative x-ray: AP AND LATERAL views of infected THR

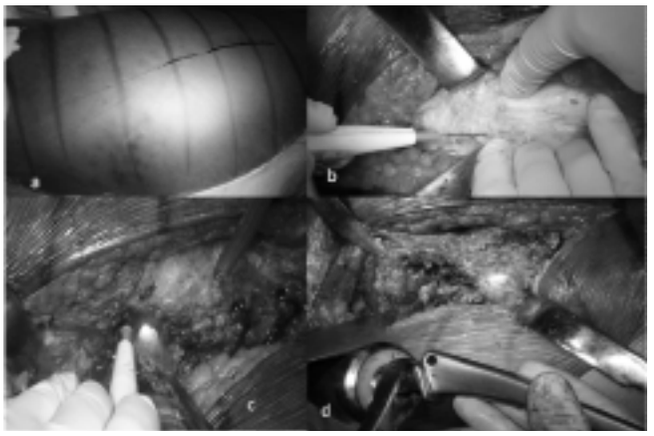
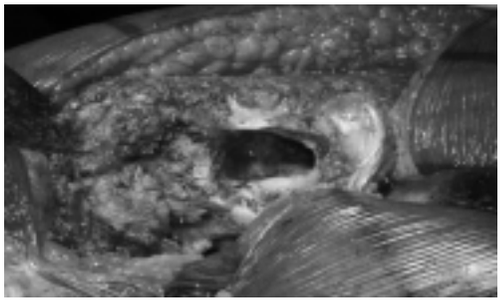


Figure- 2a: skin marking with methylene blue which facilitates closure,2b: cutting TFL and G.MAX fibres to give maximus exposure with minimum incision and avoid sciatic nerve compression,2c: exposing the joint staying flush to proximal femur and dissecting towards pyriform fossa,2d: prosthesis removed



2e femur after removal of prosthesis

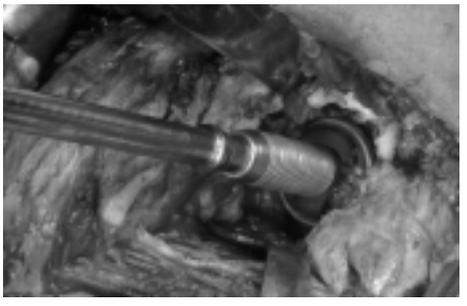


Figure 3: sequencial rimming of acetabulum till subchondral bleeding bone is reached

infected tissues. Hydrogen peroxide and betadine wash is given followed by pulse lavage.

Preparation of the articulated spacer [fig4 and fig5] - We use a custom made femoral stem which fits into corresponding moulds. Femoral stem is of one standard size and has 4 degrees taper tip, 140 mm length, 135 degrees neck shaft angle. Its maximum elliptical section 11.8mm x15mm and minimum elliptical section is 6.9mm x 5.5mm.It is made of 316L stainless steel. It is flattened at the tip on the acetabular side so as to support the cement mantle there. There is a cylindrical hole in the proximal part to accommodate with the post in the head mould [Fig 4c]. This centralises the stem in the cement head and prevents decoupling while cement is setting. The moulds are in two parts, the head mould and the stem mould and are made of aluminium. The head mould is of 4 sizes, 44 48, 52, 56 mm head size to achieve customised fit. The stem mould is of one size and is made to achieve a cement mantle of 5mm around the stem. We use 40gm bone cement[CMW-2] with vancomycin [4.5gm] and cefuroxime [2gm].[7,8,9,10,11,12,13,14,15,16]. The mould is first painted with liquid paraffin. The cement is mixed and when it becomes doughy [polymerisation starts] the mould is filled with cement. The femoral stem is put into the corresponding mould. Once cement is set the excess of cement is removed with knife. Similarly the acetabular mould is filled with cement. The femoral stem is inserted into acetabular cup. As mentioned earlier a smaller head size is preferred as this may prevent excessive friction between the spacer and acetabulum and will be less painful. The defect between head and neck is patched with cement. Excess cement is removed again. Cement spacer is then put in femoral canal and hip joint is reduced [fig6]. With the spacer insitu, traction was applied to the leg and compared with the opposite leg for limb length equality. Applied traction causes the femur to be pulled distally and, a note of distraction between the spacer and the femoral cut was made and the level on the spacer was marked. This gives an idea of how much the spacer should sink into the proximal femur so as to achieve limb length. Also the centre of the spacer is roughly matched with the tip of the greater trochanter to confirm the correct offsets. If the stem is rotationally or axially unstable, proximal cementing can be done to stabilise the spacer. However this was not needed in the patient we operated. Wound closed in layers over negative

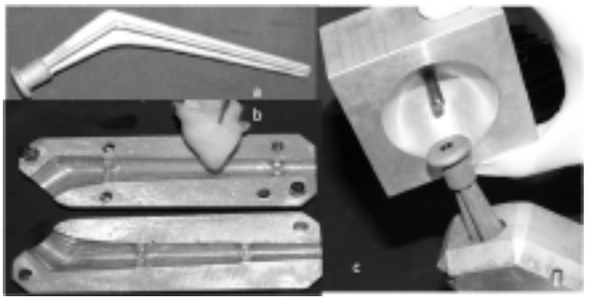


Figure 4 – a: femoral stem, b: femoral stem mould being painted with liquid paraffin, c: femoral head mould

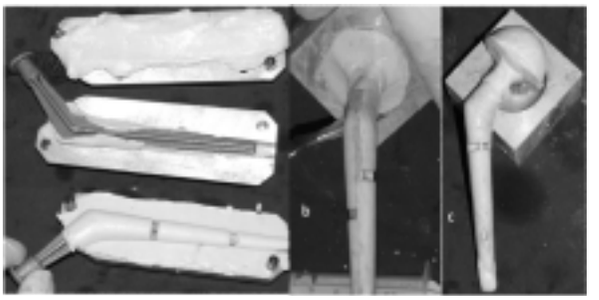


Figure 5-making of the cement spacer

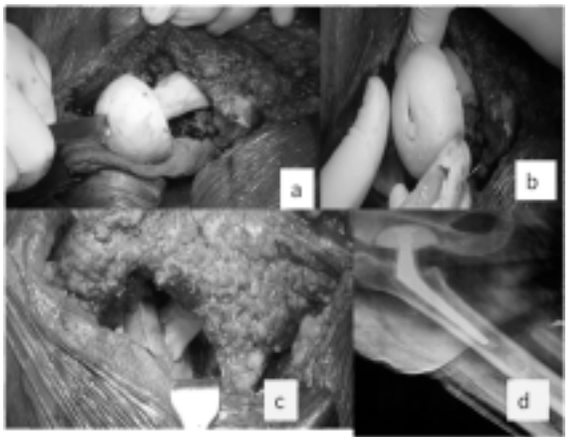


Figure 5-making of the cement spacer

suction drain. Intravenous antibiotics are given for 3 weeks followed by 3 weeks of oral antibiotics.

Post operative protocol: patient was allowed to walk toe-touch weight bearing from 2nd day post surgery and in two weeks he starts to walk partial weight bearing. Patient is never allowed to walk full weight bearing till second stage revision was done. Antibiotics were given according to the sensitivity pattern as detected by intraoperative sample.

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Source of Support: Nil, Conflict of Interest: none