

TRABACULAR METAL RECONSTRUCTION – A NEW METHOD FOR DIFFICULT REVISION ARTHROPLASTY WITH SEVERE BONE LOSS

Ashok Kumar, Mallikarjun, S Karunagarn and P Suryanarayan

Department of Orthopaedics, Apollo Hospitals, Chennai, India.

Correspondence to: Dr Ashok Kumar, Department of Orthopaedics, Apollo Hospitals, Chennai, India.

We report a case of 38 years man in whom Tantalum reconstruction was successfully performed with excellent outcome.

Key words: Revision arthroplasty of hip, Trabacular tantalum reconstruction.

PARALLEL to the gradual increase in the incidence of hip replacement over the last years, the revision surgeries have become an important problem today and are likely to remain so in the future. Loss of acetabular bone stock due to aseptic loosening and the tissue response to polyethylene wear is a major concern, and poses significant challenges at revision surgery. The challenge lies in clearly defining the location and quality of the residual bone and choosing the appropriate technique of revision. Delay in the decision to revise, leads to further bone loss, due to constant fretting by the loose components. Various authors have sought to overcome this by a variety of methods like use of morsellised bone grafts with cementation, bulk structural allografts, jumbo uncemented cups, etc.

Various authors and centres have reported a 96-98% 10 year survivorship of the revisions with the use of a variety of uncemented porous coated devices. Primary apposition of the socket surface with at least 80% of good viable vascular host bone is needed for proper integration of these uncemented cups. The modified and customized jumbo cups or oblong cups is another option in some defect patterns which enables stability and optimal surface contact.

In the absence of well-defined margins and significant bone loss due to the proximal or medial migration, acetabular revision often requires bone grafting in conjunction with the various reconstruction techniques. Shiners and Harris reported poor results with the use of bulk structural grafts (both autogenous and allogeneous). They reported re-revision rate of 60% at 16 years, raising the concerns of incomplete remodelling and revascularisation process. This leads to a structural collapse of the construct with time, leading to failure. Supporting these bulk structural grafts with rings and

cages seem to improve the outcomes and minimise the structural failure as reported by Gross AL and Garbuz P, *et al* and Marti, *et al*, who reported a re-revision rate of only 14% at 10.1 years with the use of bulk structural allografts.

Clearly there are issues with the use of large structural bone allografts in hip reconstruction. Though the initial results are very good they tend to decline with time. To some extent this also is dictated by the location of these defect mainly those involving the posterior and superior segments. Also the need of at least 70% of viable host bone surface makes the various uncemented press fit devices unsuitable in some advanced cases of revision and rerevision. Revision acetabular shells and augments manufactured with porous tantalum are being used in the last few years with good early results. Porous tantalum has considerably enhanced biological and mechanical properties.

MATERIAL CHARACTERISTICS

Tantalum as an elemental metal is biocompatible as seen by the response of osteoblasts in cell cultures. Porous Tantalum (Trabacular metal) (*Fig.1*) is produced by the deposition of commercially pure tantalum on a carbon skeleton of uniform interconnecting pores. The porosity of this construct is considerably higher than those of the other porous coated devices in use (75-80% vs 40-50%). Histological studies have shown almost 40-45% bone deposition on to the surface in 4-6 weeks. The interfacial shear strength is thus enhanced considerably.

The material elasticity and surface coefficient of friction is also high. This attribute also enables good initial implant stability and fixation. It is postulated that these enhanced properties should permit their use even in the presence of greater socket deficiencies with viable

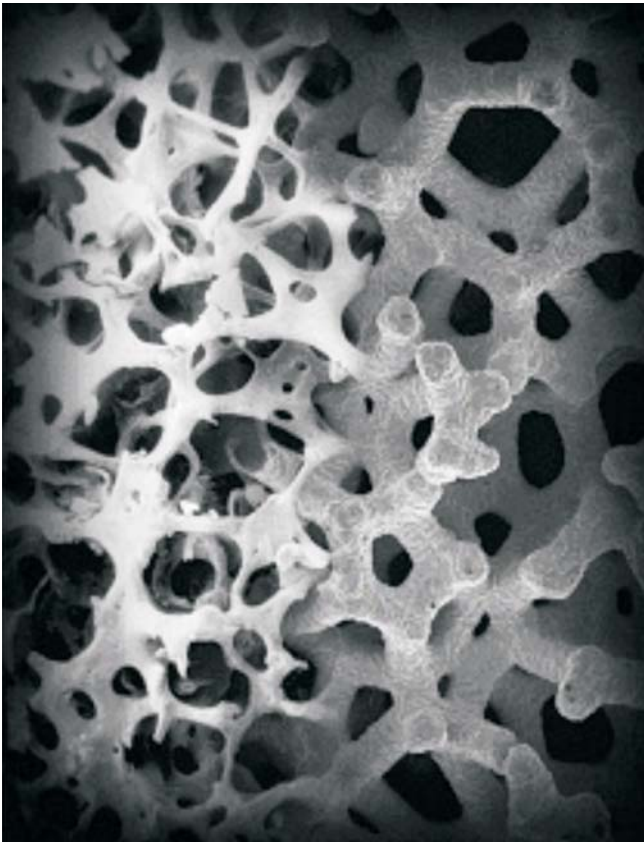


Fig.1. Porous Tantalum (Trabacular metal).

host surface of <50%. The modulus of elasticity lies between cortical and cancellous bone. This should enable better stress transfer. In view of these improved biological and mechanical characteristics, trabacular metal, today



Fig.2. Preoperative X-ray showing loose cup with extensive bone loss.

offers a good alternative option for the more difficult and challenging revision situation.

We present the case report of our first experience with this device. To our knowledge this has been used in our country for the first time.

Case study

A 38-years-old gentleman presented with pain and limp. He had sustained fracture acetabulum in 2004 (Fig.2), for which he underwent total hip Arthroplasty. The primary total hip replacement failed, following which



(a)



(b)

Fig.3. CT Axial and coronal images showing extensive bone loss with Protrusion of the acetabulum with gross expansion and thinning of the posterior column and wall.

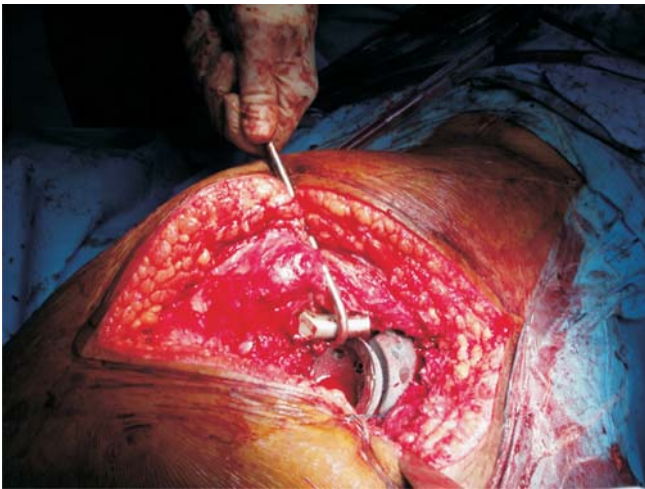


Fig.4. Intra-operative picture showing the reconstruction of the acetabulum using tantalum cup and wedge.

he underwent revision total hip replacement with hook cage and bone grafting.

He had a painful and unstable hip. The radiology revealed, Subluxation, disassociation and migration of Acetabular construct, Protrusion of the acetabulum with gross expansion and thinning of the posterior column, complete absence of postero- superior column and wall. This was a potentially unstable situation with more than 50% of acetabular defect at the crucial weight bearing area. After careful examination of the radiology a decision was taken to use Trabecular metal for revising the failed revised acetabulum. The acetabulum was reconstructed with trabecular metal shell augmented with wedge on the postero superior aspect (Figs.3&4).

The postoperative period was uneventful. The hip was stable and the patient was mobilised from day two with toe touch walking. The follow up at three months showed no loosening and the patient was encouraged to walk full weight bearing. We now have more than two years follow-



Fig.5. 2 year follow up x-ray shows good incorporation of the cup and augments.

up on this patient. We have successfully done three more of such procedures (Fig.5).

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