

Auto Bone Banking: Innovative Method for Bone Preservation

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What to Learn from this Article?

Very Innovative method to preserve bone graft in patient undergoing joint replacement

Abstract

Introduction: Bone grafting is an integral part of orthopaedic surgery; the use of bone graft is increasing consistently in traumatology and also in complex revision surgeries of hip and knee arthroplasties. Considering this fact there is a need for some way to find solution for a bone graft which has more osteoinduction, osteoconduction as well as osteogenicity and also reduced rates of graft rejection and transmission of infections. All these qualities are found in autogenous bone graft. We hereby put forward a innovative method of bone preservation by using patients own femoral head and preserving it in patients own iliac pouch and making it available for future use.

Case Report: From 2008 to 2012, total 17 numbers of operated sides were included in this method; patients had femoral neck fracture, osteoarthritis or avascular necrosis of femoral head and who underwent either hemi or total hip arthroplasty. Intraoperatively the resected femoral head was preserved in iliac pouch on ipsilateral side. This integrates with the native bone and additional bone graft would be made available for future use. We did not get opportunity to use the stored autograft.

Conclusion: This is very innovative concept for preserving patient's autogenous femoral head for future use. As conventional allograft relies upon screening procedure for infections, proper storage facilities and are expensive.

Keywords: Auto, Bone banking, Iliac pouch.

Introduction

Bone graft plays an important role in orthopaedic traumatology and revision arthroplasties of hip and knee [1]. There is always a need for bone grafts. Conventional allografting is well mentioned in to the literature. Autogenic bone graft is limited and also associated with donor site morbidity. Allogenic bone graft has other issues such as transfer of infection; less osteogenic, requires standardized screening, sterilization and

storage facility, while bone morphogenic proteins and bone graft substitutes are costly. Autologous bone grafts are superior over allografts and always desired by the surgeons, so remains the gold standard. There has been report about using the patient's own rib grafts stored in paraspinal region for future use [2]. Considering this fact senior author approached ethical committee with this concept. There is only one study by Hing et al [3], which mentioned about this technique. Still this field

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Figure 1: Bilateral arthritic hip joint

2008 till 2012.

Patients who underwent either hemi or total hip arthroplasty were included (Fig.1) while patients in whom infection in hip joint was suspected, extracted head was sent for histo-pathological examination and were excluded from this study.

While draping hip joint, proper care is taken to keep iliac region in to the sterile field. First, procedure on hip was carried out. During the procedure on hip joint such as hemi or total hip replacement the femoral head is extracted out (Fig.2) and it is cleaned thoroughly with normal saline. Articular cartilage and damaged surface is cleaned, periosteum from the neck is stripped out. After that it is kept in chlorhexidine solution till the main procedure on hip is completed and wound is sutured. After the suturing of hip wound, anterior approach to the iliac crest was taken which was measuring approximately that of femoral head size and pouch was created inside ipsilateral iliac fossa extra-periosteally taking the precaution to preserve the iliacus muscle. Instead of stripping the iliacus, it was just elevated. Then cleaned head was stored inside the pouch and wound was closed in layers without suction drain. No specific instructions were given to the patients. This extra procedure hardly takes extra ten more minutes after the hip surgery.

Discussion

Patients were explained about the life of primary prosthesis, about the revision surgery, if at all it is required and need for use of bone graft (either autograft or allograft). If patient is younger then there is more chance that he/she might need revision surgery in future. Patients who consented for this were included. So far we did not get opportunity to use the stored femoral head but we intend to use this graft whenever there is future requirement of bone graft in any form for the same patient. Hing et al [3] in 2004 presented a study on 13 patients using this technique. They stated that this provides good osteoinductive potential and reduces the chances of infections and transmission of any diseases. Hing et al and Chugh et al used histological measures at the time of retrieval to know the status of osteocytes [2,3]. There could be chance of local complications such as infection or incisional hernia at the operative site; we did not face any of these complications. Few patients complained of discomfort in the initial period but this was resolved gradually over period of time. This method reduces chance of transmission of infection and eliminates the need for screening of bone and no special storage facility is

needs further research.

Case Report

Hospital ethics committee has approved this study. Proper informed consent from patients was taken in their own language. Senior author operated all the cases.

This procedure has been performed on 17 operated sides from

required and it is autogenous. It can be performed at any remote centre where hip surgeries are carried out. Instead of discarding the femoral head it can be utilized in future by auto bone banking in patients own iliac pouch. Though we have not used it for any of the revision surgery but bone left will always be useful, it can always act as scaffold. Its advantage is that it is autologous. It can have both osteoconductive as well as osteoinductive properties. In revision cases where there is enormous bone loss, allograft can be mixed along with this autograft to fulfill the required graft needs. This mixture of autograft and allograft will be definitely superior to only allograft. There is feeling of slight discomfort during initial days but gradually this subsides.

This it is cost-effective alternative as money that is being spent on screening procedure and also for storing this graft at bone bank is saved and also if there is requirement of this graft in future then it can be availed without spending extra money to bone bank; being autologous, the risk of rejection of grafts is less and sterilization procedures are not required [4-7]. It also has been found that sterilization by gamma irradiation causes damage to osteoinductive proteins and alters the osteomechanical properties and Ethylene oxide has less penetration of gas in bone grafts and there have been reports of allergic reactions because of ethylene oxide [8]. Preserved bone might not have osteogenic properties but it can have



Figure 2: Extraction of femoral head after dislocating the arthritic hip

osteoinductive (BMP) as well as osteoconductive (Scaffold) properties, which are similar to allograft. These properties will be studied after retrieval of the graft for use. We did not have any complications at iliac pouch site and also patients were comfortable after initial few weeks.

Conclusion

This is innovative and cost effective option for autogenous bone preservation, which can be carried out at remote settings and free from screening procedures. There are few drawbacks of our method such as we did not get opportunity to retrieve and use the femoral head for any other future procedure. Follow up of the series needs to be completed and results needs to be evaluated in future supplements.



Figure 3: After bilateral total hip arthroplasty and auto bone banking

Clinical Message

During primary arthroplasties of hip, the head can be preserved using this cost saving innovative technique and if required, this graft can be utilized for future revision arthroplasties for the same patients.

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