



CAN KNEE SLICES BE A NEW SOURCE OF BONE ALLOGRAFT TO SUPPLEMENT FEMORAL HEAD ALLOGRAFT?

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SUMMARY

The demand for bone allograft in Malaysia is increasing every year, unfortunately the number of deceased donors are still lacking.

Bone allograft can also be procured from living donors i.e. femoral heads, which are harvested during arthroplasty surgeries.

Procuring knee slices from primary knee arthroplasty surgery could possibly offer a supplementary source of allograft for bone banks to address the increasing demand for bone grafts.

The objective of this study was to determine whether the retrieval of knee slices from total knee arthroplasties present a realistic supplement to boost the cache of allografts available from bone banks.

1.0 Introduction

With the constantly evolving surgical techniques and methods in Orthopaedic surgery, Maxillofacial surgery, even Neurosurgery, the list of conditions in which we are able to treat are growing¹. However, in conjunction with this, the need for more complex equipment and surgical products is increasing. Bone allografts are currently becoming an integral constituent in our surgical armamentarium.

Our study analyses the plausibility of procurement of knee slices from Total Knee Arthroplasties in supplementing the supply of bone allografts in our Bone Bank.

2.0 Materials and Method

Samples of bone discarded from hip and knee arthroplasty surgeries were collected in this cross-sectional study from June 2015 to June 2016. All steps starting from selection of patients as bone donors to procurement of bones were based on the standard operating procedures (SOPs) established by the UMMC bone bank².

Live donors for bone allografts were divided into two groups: Femoral Head and Knee Slice groups. Clinical and demographic data were compiled and analysed. The amount of cancellous bone available was analysed in terms of volumetric and weight characteristics.

3.0 Results

Sixty-seven bone samples consisting of 34 femoral heads and 33 knee slices were acquired. The mean volume of available cancellous bone from knee slices was significantly less than that of the femoral heads by 6.7mLs per sample ($p=0.002$), while the mean weight was significantly less by 7.6 g per sample ($p=0.005$).

Factors that influenced the amount of bone obtained from femoral heads were patient's gender, height, weight, and whether or not the patient had a neck of femur fracture, while the main variable influencing the amount of bone acquired from the knee slices was the severity of the malalignment between the tibia and femur.

We also observed that the bone chips processed from femoral heads were generally larger, about 0.8 - 1cm² each while bone chips from processed knee slices were generally smaller, about 0.3 - 0.5cm².

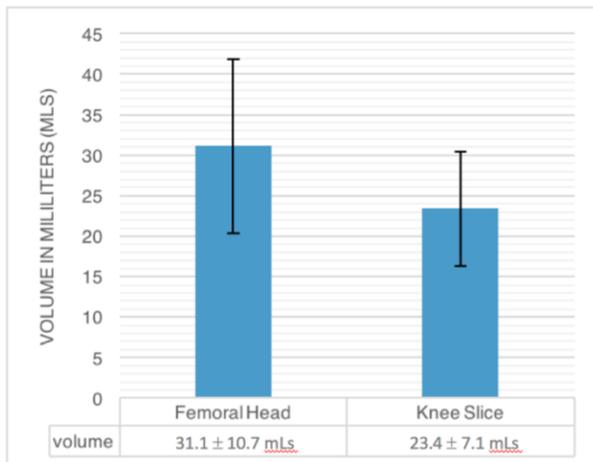


Fig 1. Mean volume differences between femoral head and knee slices.

4.0 Discussion & Conclusion

With the ever-expanding array of surgical procedures due to enhancement in knowledge and technology, there is an increasing requirement for bone grafts in orthopaedic surgery. Allografts has a relatively abundant supply and avoids donor site morbidity³.

Live donor allografts comprise of bone available from surgical discard in arthroplasty surgeries and can be made readily available from bone banks. The traditional practice is for procurement of femoral heads from hip arthroplasty surgeries.

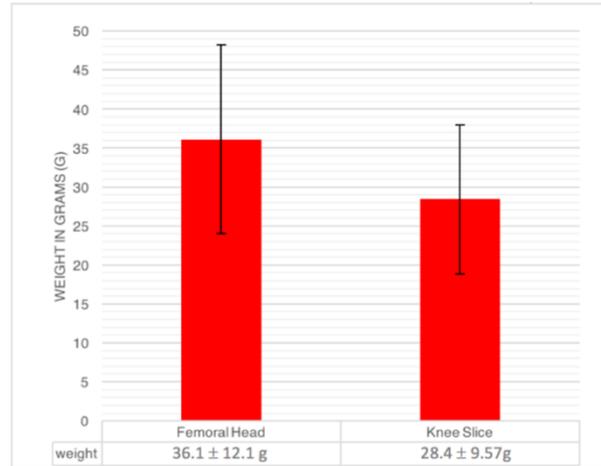


Fig 2. Mean weight differences between femoral head and knee slices.

Primary knee replacement is a very commonly performed surgery and there is a significant amount of surgical discard, especially from the proximal tibia and distal femur. The volume and weight of cancellous bone retrieved from knee slices are comparable albeit slightly less compared to the bone from femoral heads.

However, these do present as a viable supplement to augment the number of available grafts as on average there were a higher number of total knee replacements performed compared to the number of hip arthroplasties in our centre. Clear guidelines and exclusion criteria need to be adopted to avoid procurement of low yield samples. We suggest for retrieval of combined bilateral TKR discard to ensure high allograft yields.

This study indicates that knee slices provided a significantly less amount of cancellous bone than that of femoral head, however the bone can still be harvested as a supplementary source of bone allografts. This is due to the significantly higher frequency of TKRs being performed in general as compared to THRs. Femoral head is still the gold standard of harvested bone from live-donors, as it provides more consistent cancellous bone, and is easier to process and prep for implantation.

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