

Blood Transfusion In Hip And Knee Joint Replacement Surgery

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Citation

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Abstract

Introduction Orthopaedic surgery consumes a considerable proportion of blood available to the National Health Service. Effective and judicious management of available blood is therefore vital. In order to review the usage of packed red cells in our centre, we carried out an audit involving patients who underwent total hip and knee replacement. Methods A retrospective audit was carried out to include all patients who underwent elective total hip and knee replacement, and underwent blood transfusion. A total of 449 patients were included and those who underwent transfusion were identified. Results Sixty five patients (14.5%) underwent blood transfusion. Approximately 5% required blood transfusion in both primary and revision TKR. 16% transfused in uncemented primary THR. 27.3% transfused in cemented primary THR. 30.7% transfused in uncemented revision THR. 77.7% transfused in cemented revision THR. 133 units were transfused in total out the 198 requested. Conclusion The present audit demonstrates that the cross matched to transfused ratio is within 2:1. Efforts should be made to reduce it to 1:1 where transfusion is necessary. This will aid in not only reducing the cost of transfusion, but also in reducing the risks associated with blood transfusion.

INTRODUCTION

Hip and knee joint replacements are very common and very successful orthopaedic procedures and the numbers done are increasing year on year. This is partly to do with the fact that it is being done in much younger age groups than before and due to the increase in the aging population. It is estimated that by 2033, 23% of the population will be aged 65 and above.¹

Orthopaedic surgery consumes a considerable proportion of blood available to the National Health Service. It has been reported to be in the range of 10 – 15%.^{2,3} The increasing demand will further burden the National Blood service.

Blood transfusion is accompanied by potentially fatal hazards.⁴

Although the risk of infection contracted through blood transfusion is declining, the non infectious serious hazards of transfusion will contribute to the morbidity and mortality associated with transfusion. It is also predicted that this might remain as a leading cause in the coming years.⁵

Effective and judicious management of available blood is therefore vital and should become part of joint replacement surgery.

In order to review the usage of packed red cells in our centre, we carried out an audit involving patients undergoing elective total hip (THR) and total knee (TKR) joint replacement. The aim of the audit was to assess the extent of red cells being used and to compare it to other studies and also to serve as a baseline for future audits in our department.

METHODS

A retrospective audit was carried over a 6 month period between February 2008 and July 2008. A full list of patients who underwent elective THR and TKR was obtained. All patients who underwent blood transfusion were identified from the hospital transfusion register. Four hundred and forty nine patients were included in this audit.

The trust guidelines for transfusion in surgical patients at the time of audit were that

- If pre op Haemoglobin (Hb) is less than 8g/dl & the surgery is associated with probability of significant blood loss (no time to raise Hb by other means)
- Pre op anaemia must be investigated

- Post-operative Hb falls below 8g/dl and the patient is distressed or actively bleeding

RESULTS

Out of 449 patients, 65(14.5%) underwent blood transfusion. One hundred and thirty three units were transfused in total out the 198 requested. According to the procedure, results are as follows. Figure 1 and 2 shows the units transfused and the percentage of blood used in total.

Figure 1

Figure 1 - No. of units transfused per procedure

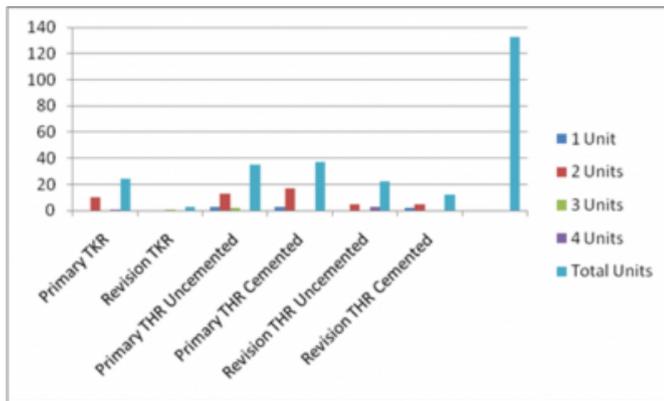
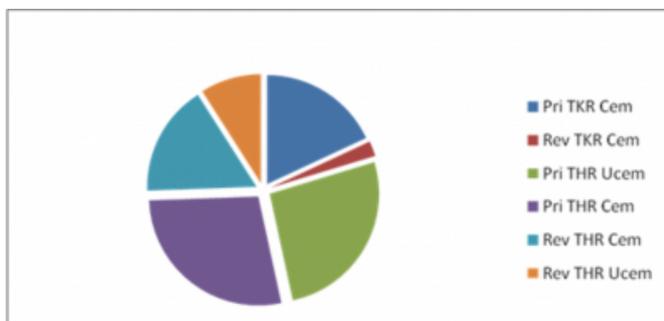


Figure 2

Figure 2 - Percentage of blood used procedure wise



Primary TKR using cement: Two hundred and seven patients underwent primary cemented TKR out of which 11 (5.3%) required transfusion. Ten patients were transfused 2 units and 1 patient was transfused 1 unit. 24/133 units were transfused in total (18.04%).

Revision TKR using cement: Twenty four patients underwent revision cemented TKR out of which only 1 (4.3%) was transfused. 3/133 units were used (2.25%).

Primary THR not using cement: One hundred and twelve patients underwent uncemented THR out of which 18 (16%) required transfusion. Three patients were transfused 1 unit,

13 patients were transfused 2 units and 2 patients were transfused 3 units. 35/133 units were transfused in total (26.31%).

Primary THR using cement: Seventy one patients underwent primary cemented THR out of which 20 (27.3%) required transfusion. Three patients were transfused 1 unit and 17 patients were transfused 2 units. 37/133 units were transfused in total (27.81%).

Revision THR not using cement: Twenty six patients underwent revision THR without cement out of which 8 (30.7%) required transfusion. Five patients required 2 units and 3 required 4 units. 22/133 units were transfused in total (16.54%).

Revision THR using cement: Nine patients underwent revision cemented THR out of which 7 (77.7%) required transfusion. Two patients were transfused 1 unit and 5 required 2 units. 12/133 units were transfused in total (9.02%).

Procedure wise, the cost per patient for transfusion was as follows: Primary TKR (11/207 pts) - £16.19, revision TKR (1/24 pts) - £18.22, primary un-cemented THR (18/112 pts) - £43.66, primary cemented THR (20/71 pts) - £70.81, revision un-cemented THR (8/26 pts) - £118.22, revision cemented THR (7/9 pts) - £186.29.

Cost per patient group wise, was as follows: In total 231 patients underwent primary and revision TKR (207 and 24 respectively). The total cost of transfusion was £3,772.44. As a result, the cost per patient is £16.33. 218 patients underwent cemented & uncemented primary THR and cemented & uncemented revision THR (71, 112, 9 and 26 respectively). The total cost of transfusion was £14,810.32, giving the cost per patient of £67.93.

DISCUSSION

In a large study conducted in the US, the rate of blood transfusion in knee and hip replacements has been shown to be 39 and 57 percent respectively with an average of 46%.⁶

Others have reported between 37-90% for THR and for TKR it was found to be 22-97%.³ It was also noted that the average number of units transfused for THR and TKR was 2 and 1.6 units respectively.

In another study, they compared the rates of transfusion in primary THR and TKR before and after introduction of a limited group and save policy. Their results showed a

decrease from 32 to 28% in primary THR, and from 41 to 32% in primary TKR.⁷ Their crossmatched to transfused ratio (CT ratio) decreased from 3.5:1 to 2.3:1 and 1:1 after a re-audit.

Similarly, the rates of transfusion for TKR was noted to be 58% and 35% , and that of THR was found to be 84% and 38% before and after implementation of the guidelines in another audit. The overall transfusion rate was also reduced from 71% to 37%. Repeat audit showed this rate was 32% (THR) and 48% (TKR) after a year. The average units transfused overall before and after guidelines was 2.3 and 2.4 units respectively.⁸

In our audit, the transfusion rate for both primary and revision cemented TKR was found to be approximately 5% which is well below other reported studies, and the transfusion rates for both primary and revision THR were comparable with the national average. (Uncemented THR 16%, cemented THR 27.3%, uncemented revision THR 30.7% and cemented revision THR 77.7%) The mean units transfused were 2.25 and 2 respectively for TKR and THR.

Comparing their blood transfusion practice to national levels, Rogers and Johnstone found that CT ratio for THR fell from 3.21 to 1.62 for THR and 1.86 to 1.58 for TKR after implementation of guidelines and re-audit.⁹

In our audit, 198 units were requested out of which 133 were utilised. This is within the guidelines that recommend that

the CT ratio should be 2:1.^{10, 11}

The total cost of transfused blood given that the unit of blood cost 139.72 at the time of this audit, was £18582.76. Out of 196, 65 units were not utilised, and the cost of this is £9081.8.

According to the British Committee for Standards in Haematology (BCSH) guidelines¹², the primary goal should be to manage patients without the need for transfusion and avoid transfusion when haemoglobin is 10 g/dl.

Numerous methods have been suggested and used to reduce the use of blood in elective THR and TKR. These include the intraoperative and perioperative cell salvage, antifibrinolytic agents, treatment of anemia, reviewing antiplatelet drugs and anticoagulation.^{12,13,14,15} Appropriate use of these could help with reducing the transfusion rate.

CONCLUSION

The present audit demonstrates that the CT ratio is within 2:1. Although this is within the recommended guidelines, efforts should be made to reduce it to 1:1 where transfusion is necessary. Individual units could audit their use of blood in THR and TKR. This would enable them to assess the extent of use and investigate any unnecessary wastage of blood and implement guidelines accordingly. This will aid in not only reducing the cost of transfusion but also in reducing the risks associated with blood transfusion.

References

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