Femoral Bone Plug in Total Knee Replacement

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The intramedullary alignment guides used in total knee replacement disrupt the intramedullary vessels, resulting in greater postoperative blood loss. The use of an autologous bone plug to seal the intramedullary femoral canal has been shown to be effective in reducing postoperative bleeding. The authors present a simple technique to create a bone plug from the anterior chamfer femoral cut to perfectly seal the intramedullary canal of the femur. [Orthopedics. 2015; 38(10):617-618.]

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Abstract: The intramedullary alignment guides used in total knee replacement disrupt the intramedullary vessels, resulting in greater postoperative blood loss. The use of an autologous bone plug to seal the intramedullary femoral canal has been shown to be effective in reducing postoperative bleeding. The authors present a simple technique to create a bone plug from the anterior chamfer femoral cut to perfectly seal the intramedullary canal of the femur. [Orthopedics. 2015; 38(10):617-618.]

The intramedullary alignment guides used in total knee replacement present the disadvantage of disrupting the intramedullary vessels and connecting the femoral canal to the joint space. The result is a significant increase in postoperative blood loss and therefore an increased need for a blood transfusion. The use of an autologous bone plug to seal the intramedullary femoral canal has been shown to be effective in reducing postoperative bleeding. Ko et al performed a prospective study of 262 patients undergoing primary total knee replacement to assess perioperative transfusion requirements in patients with a femoral bone plug and patients without a femoral bone plug. They observed that patients without a femoral bone plug required significantly more blood transfusions than patients with a femoral bone plug (64.4% vs 35.9%).

The autologous bone plug is typically “custom-made” by the surgeon using the femoral bone cuts. The plug is then impacted into the canal with the aim of sealing the latter. Nonetheless, the triangular-trapezoid shape of the femoral cuts cannot match the circular shape of the alignment guide entry point. This may result in an incomplete closure of the canal.

In this article, the authors describe a simple technique to create a bone plug from the femoral cuts to perfectly seal the intramedullary canal. To the best of their knowledge, the literature lacks techniques describing such a procedure.

Surgical Technique

Prior to implanting the femoral prosthetic component, the surgeon must model the anterior chamfer femoral cut. The chamfer cut should be devoid of debris, cartilage, or soft tissue, thus consisting of cancellous bone only. The chamfer cut typically has a triangular section and a pyramidal 3-dimensional aspect. The bone should be modeled so that the length of the plug corresponds to the anteroposterior section of the intercondylar notch. The width of the chamfer cut is gen-
generally larger than the diameter of the alignment rod entry hole and is therefore large enough to seal the canal (Figure 1). Once the bone plug has been adequately modeled, its convex side (ie, the apex of the pyramid) is directed over the center of the hole (Figure 2). It is then impacted into the soft cancellous bone with an osteotome handle and an impactor (Figure 3). By doing so, the “sharp” edge of the bone plug digs into the soft femoral bone. The plug must be impacted until it is perfectly flush to the notch (Figure 4). This technique easily allows a perfect seal of the canal.

**DISCUSSION**

Allogeneic blood transfusions may represent a potential hazard to patients receiving the blood. Risks include allergic reactions, infections, fever, iron overload, acute immune hemolytic reaction, delayed hemolytic reaction, and graft-versus-host disease. Several authors have shown that plugging the femoral canal is useful to decrease the perioperative rate of blood transfusions. The canal can be closed with polyethylene or cement plugs, autologous bone plugs, fibrinogen concentrates, fibrin tissue adhesive, and cryo-based fibrin sealant. The safety, cost-effectiveness, and complications of these methods have not been studied in prospective randomized controlled trials. However, the economic and biological advantages of using autologous bone graft, as opposed to the aforementioned techniques, are predictable.

**CONCLUSION**

The authors have presented a handy and straightforward method to plug the femoral canal with autologous bone. The bone plug is safe, costs nothing, and does not relevantly delay surgical time. Moreover, the wedge shape of the plug makes it ideal to be impacted into the soft cancellous bone.

**REFERENCES**