Technical note

Reduced blood loss with ligation of medial circumflex pedicle during total hip arthroplasty with minimally invasive posterior approach

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ABSTRACT

A total hip arthroplasty procedure can lead to significant perioperative blood loss due to bleeding from the medial circumflex pedicle. When either the anterior or posterior approach is used, haemostasis of this pedicle, which is typically performed with electrocautery without dissection, can be inadequate. The purpose of this study was to evaluate the efficacy of a novel surgical technique in which the pedicle is directly ligated. A single-centre, single-surgeon prospective study was performed to compare pedicle ligation to electrocautery (control group). In the ligation group, the pedicle was identified in front of the upper-third of the quadratus femoris and ligated. The mean postoperative blood loss in the ligation group (293.4 ± 34.8 mL) was significantly less than in the control group (419.0 ± 36.8 mL) (P < 0.05). Pedicle ligation is a simple procedure that reduces blood loss during total hip arthroplasty.

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1. Introduction

Because total hip arthroplasty (THA) procedures cause blood loss, careful planning and control measures are needed [1,2]. This blood loss can lead to postoperative anaemia, which is associated with lower functional recovery scores, higher transfusion rates and longer hospital stays [3–6]. With blood transfusion comes the risk of infection [7]. Damage to the medial circumflex pedicle is one of the major causes of blood loss [8]. We systematically ligate this pedicle when we perform THA through a posterior approach [9]. The purpose of this technical note was to describe this surgical technique and evaluate its efficacy in terms of postoperative blood loss. Patients undergoing total hip arthroplasty for hip osteoarthritis were split into two matched groups for comparison: one group with ligation of the pedicle and the other with electrocautery of the pedicle only (control group).

2. Anatomy review

The medial femoral circumflex artery arises from the deep femoral artery and winds towards the posterior side of the femoral neck by passing between the pectineus and iliopsoas muscles and in front of the upper-third of the quadratus femoris muscle (Fig. 1). It enters the joint capsule at the inferior gemellus muscle over its greater trochanter insertion point. The ascending branch provides most of the blood supply to the femoral head and the descending branch forms the cruciate anastomosis.

2.1. Surgical technique description

The medial circumflex pedicle must be ligated before any of the pelvic and trochanteric muscles are cut (Video 1). The fibres of the upper-third of the quadratus femoris muscle are spread apart using long Bengolea forcepts. The artery-vein pedicle may be difficult to see because it is surrounded by fatty tissue. A suture is passed in front of this fatty tissue as soon as it is visible, without trying to dissect the individual blood vessels. Right angle forceps are used to pass the suture to reduce the risk of tearing the pedicle. The pedicle is tagged with long suture tails to avoid later cutting it proximal to the ligation later during the procedure.

2.2. Pilot comparative study

The surgical blood loss was compared in two groups of patients receiving a cementless total hip arthroplasty (Omnifuse stem, Schuster cup, Zimmer™, Winthetur, Switzerland). All patients were operated by the same surgeon using the postero-lateral approach over a two-year period and followed prospectively. Blood loss was estimated using the Mercuriali and Inghilleri algorithm [10]. The two groups of 35 patients had similar age, gender and body mass index characteristics (Table 1). The mean postoperative blood loss in the ligation group was 293.4 mL ± 34.8 (range 104–602). It was 419.0 mL ± 36.8 (range 156–789) in the control group where electrocautery was performed during capsule exposure.

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without directly dissecting the pedicle (P < 0.05). Transfusion was required in five patients in the ligation group and 19 in the control group (P < 0.05) because of haemoglobin levels below 8 g/dL. The overall perioperative blood loss was significantly less in the ligation group (mean 481.92 mL, range 212–984) than in the control group (mean 836.26 mL, range 327–1354) (P < 0.05) (Table 2).

3. Discussion

It is important to reduce surgical blood loss during a total hip arthroplasty procedure. Various published studies have described methods to reduce this blood loss, such as tranexamic acid injections [11,12], intraoperative blood salvage [13], or local administration of substances leading to haemostasis [14]. But no studies have described medial circumflex pedicle ligation. Electrocautery of this pedicle without first dissecting, it is often not adequate for controlling the bleeding. Intraoperative bleeding can go undetected because internal rotation of the leg narrows the artery. As a consequence, when the joint is reduced at the end of the procedure, bleeding can restart and trigger haemorrhages that can have serious consequences [15] and could have been prevented by ligating the blood vessel. This study should be supplemented by a larger, randomized study to confirm these preliminary results.

4. Conclusion

Ligation of the medial circumflex pedicle is a simple surgical procedure that significantly reduces postoperative blood loss during total hip arthroplasty by the posterior approach.

Disclosure of interests

P. Chiron is a consultant for Zimmer, Smith and Nephew and Sanofi, and has received royalties from Zimmer and Integra. The other authors have no conflict of interest.

Appendix A. Supplementary data

Supplementary data (Video 1) associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.otstr.2013.11.013.

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