



Review

Techniques to reduce blood loss during open myomectomy: a qualitative review of literature



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ABSTRACT

Open myomectomy is the most adopted surgical strategy in the conservative treatment of uterine fibroids. According to several studies, the likelihood that a woman could develop uterine myomas is estimated around 75% by the age of 50. Open myomectomy is nonetheless a complicated surgery in terms of blood loss and need for transfusion. Many strategies have been published with the aim of limiting intra and post-operative bleeding complications. The scope of this review is to describe in detail the different techniques reported in literature focusing on their validity and safety.

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Introduction

Uterine fibroids are considered one of the most common gynaecological problems affecting women during their fertile

years. Their incidence is significant considering that about the 70% of women at the age of 50 years could be affected [1].

Fibroids are smooth cell and connective cell-type tumours which can be sited in different locations and sometimes developed

Abbreviations: IVF, *in vitro* fertilization; GnRHa, gonadotrophin releasing hormone analogues.

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Table 1
Techniques to reduce blood loss in open myomectomy (placebo-controlled studies).

| | Sample size ^a | | Uterine size (pw) | Blood loss (ml) | Hb post op fall (g/dl) | Number of fibroids removed | Percentage of women transfused (%) |
|----------------------|--------------------------|------------|-------------------|-----------------|------------------------|----------------------------|------------------------------------|
| Taylor 2005 [6] | 28 | Treated 14 | 18 ± 3.7 | 489 ± 362 | 2.79 [0.33] | 10.5 [1–24] | 1 (7%) |
| | | Control 14 | 17 ± 3.4 | 2359 ± 1241 | 2.96 [0.92] | 4.5 [1–34] | 11 (79%) |
| Ikechebelu 2010 [12] | 93 | Treated 54 | n.a. | 516 ± 293 | n.a. | n.a. | 11 (20%) |
| | | Control 39 | | 756 ± 286 | | | 21 (54%) |
| Frederick 1994 [27] | 20 | Treated 10 | 17 [14–24] | 225 [150–400] | 1.7 [0.7–2.3] | 14 [1–81] | 0 |
| | | Control 10 | 18 [14–24] | 675 [500–800] | 5.3 [4.0–6.4] | 8 [4–60] | 5 (50%) |
| Raga 2009 [56] | 50 | Treated 25 | 18.2 ± 2.7 | 80 ± 25.5 | 0.5 ± 0.2 | 3.2 ± 1.2 | 0 |
| | | Control 25 | 17.9 ± 1.4 | 625 ± 120.5 | 2.8 ± 0.9 | 3.1 ± 1.6 | 5 (20%) |
| Celik 2003 [50] | 25 | Treated 13 | 15.7 ± 2.6 | 472 ± 77 | n.a. | 5.5 ± 1 | 2 (15.3%) |
| | | Control 12 | 15.5 ± 2.8 | 621 ± 121 | | 5.3 ± 0.9 | 4 (33.3%) |
| Benassi 2000 [53] | 58 | Treated 29 | n.a. | n.a. | 0.9 [0.1–2.1] | 9 [2–17] | n.a. |
| | | Control 29 | | | 1.7 [0.1–2.9] | 6 [2–11] | |
| Caglar 2008 [43] | 100 | Treated 50 | n.a. | 804 ± 482 | n.a. | 3.3 ± 3.7 | 15 (30%) |
| | | Control 50 | | 1047 ± 617 | | 2 ± 1.8 | 10 (20%) |
| Shokeir 2013 [51] | 108 | Treated 54 | 17 ± 2.5 | 364 ± 279 | 1.4 ± 0.2 | 4.6 ± 3.7 | 2 (4%) |
| | | Control 54 | 16.7 ± 2.9 | 485 ± 361.3 | 1.9 ± 0.1 | 4.4 ± 3.5 | 10 (18.5%) |

Pw, pregnancy week; Hb, haemoglobin; n.a., not available.

Data are presented as mean ± SD or median [range].

^a Data presented as study versus control group.

inside the uterine cavity (submucous, intramural, subserosal). The commonest symptoms are menorrhagia and those related to pressure against surrounding organs (sporadic constipation, voiding disturbance, pelvic pain, dyspareunia), which in turn depend on the size and position of the fibroids [2]. Another important aspect is the potential impact of fibroids on fertility. Data suggest that the incidence of infertility is related to the location of fibroids with demonstrable negative effects in the case of submucosal fibroids, whilst there is still uncertainty with regards to the effect of intramural fibroids [3]. Subserosal fibroids seem to be of negligible significance both for IVF techniques and spontaneous conception [4,5].

Currently, there are several strategies for the treatment of fibroids but myomectomy remains numerically the most common and at the same time the most efficient uterus-sparing treatment [6]. Nevertheless, this procedure is associated with known risks, chief of which is excessive peri- or post-operative blood loss which sometimes necessitates hysterectomy.

The risk of bleeding depends on the number, the size and the position of fibroids removed. In order to reduce intraoperative haemorrhage, many authors have proposed different strategies both for laparoscopic and abdominal myomectomy [7]. In this paper, we focus on techniques which have been reported at open myomectomy, where the number of fibroids and their size are considerably higher and consequently the risk of haemorrhage is increased (Table 1).

Material and method

A systematic search was undertaken of the MEDLINE/EMBASE database with no restriction of language or time period. The search strategy consisted in the use of various combinations of the following keywords “open myomectomy”, “blood loss”, “laparotomy”, “uterine fibroids”, “misoprostol”, “sulprostone”, “tourniquet”, “uterine artery embolization”, “uterine artery ligation”, “haemorrhages”, “haemostasis”, “haemostatic factors”, “hemostasis”, “uterotonics”, “oxytocin”, “vasopressin”, “bupivacaine”, “epinephrine”, “dinoprostone”, “prostaglandins”. Only techniques adopted to reduce intra-operative bleeding were evaluated, and only if

objective data regarding blood loss was presented. In view of the limited number of randomized controlled trials, prospective controlled series were also analyzed. Based on the keywords, a total of 1031 articles were found of which 25 fulfilled our criteria and were evaluated.

Results

Tourniquet techniques

The use of tourniquet in uterine surgery was reported about 60 years ago [8,9]. It consists in interrupting the blood supply to the uterus by compressing the main feeding vessels. In the single tourniquet technique a single suture is applied around the cervix to occlude both uterine arteries, while in the triple tourniquet the ovarian vessels are occluded lateral to the ovaries.

Two randomized control trials have been published assessing the role of triple tourniquet during myomectomy. In the study by Taylor et al., 28 patients with a uterine size of more than 14 weeks were randomized to either triple tourniquets or no tourniquets. None of the patients had a history of bleeding disorders, and the preoperative haemoglobin was over 10.5 g/dl. During the procedure, a size 1 polyglactin suture was applied around the cervix and a 3 mm Westcott anaesthetic anti-syphon tube was hitched around both infundibulopelvic ligaments. The average of estimated blood loss was significantly lower in the treated group (2359 ml versus 489 ml, $p < 0.0001$) as well as the number of patients needing blood transfusion (11 versus 1) [6].

Subsequently, the same authors have used a different technique in an attempt to improve the standard triple tourniquet technique. For the tourniquet around the cervix, good results were demonstrated both with the Roeder knot or sterile cable ties which allows retightening the suture when necessary [10]. To avoid ovarian ischaemia, a vascular clamp was designed which can be applied medial to the ovaries without injuring the fallopian tube. The ovarian artery clamp is a standard 18 cm vascular clamp with a circular hole just below the hinge large enough to accommodate the fallopian tubes. Preliminary results appear to

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