Topics in plastic surgery of the breast
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REOPERATION FOR HAEMATOMA AFTER BREAST REDUCTION WITH PREOPERATIVE ADMINISTRATION OF LOW-MOLECULAR-WEIGHT HEPARIN: EXPERIENCE IN 720 PATIENTS
ABSTRACT

BACKGROUND: Venous Thrombo Embolism (VTE) prophylaxis is of paramount importance in the management of surgical patients. Mechanical as well as pharmacologic modalities may be used. With the use of anticoagulative agents there is a potential for increased operative and postoperative bleeding.

AIM: To assess the safety of perioperative use of low molecular weight heparin (LMWH) in the setting of breast reduction surgery.

METHODS: Retrospective assessment of the reoperation rate due to haematoma formation for breast reductions performed under a regimen of preoperative and postoperative administration of LMWH during a 10 year period.

RESULTS: A total of 720 patients (1358 breasts) received preoperative and postoperative treatment with LMWH. Reoperation due to haematoma formation was required for 37 breasts in 37 patients (5.1% of patients and 2.7% of breasts). Eight patients (1.1%) required transfusion. No patient or operative factors were associated with the need for reoperation. There were no documented cases of deep vein thrombosis or VTE.

CONCLUSION: Use of a pre and postoperative LMWH prophylaxis regimen is associated with a reoperation rate for haematoma that is in the upper range reported in the literature.

Oren Lapid, Lars Piersen, Chantal M.A.M. van der Horst

INTRODUCTION

Venous thromboembolism (VTE) is a surgical complication with the potential for deleterious patient morbidity and mortality. VTE prevention has received increased attention in recent years leading to the adaptation of different protocols for its prevention. Possible modalities used are: behavioral with early mobilization; mechanical with compression stockings or the use of intermittent pressure devices; and pharmacological, using antithrombotic medications.

The American College of Chest Physicians (ACCP) Evidence-Based Clinical Practice Guidelines (8th Edition) stratify patient risk and prophylaxis for VTE according to the magnitude of the procedure performed and do not make allowances for individual patient risk factors [1]. There are recommendations for several surgical disciplines, however there are no specific recommendations for plastic surgery [2].

In the plastic surgical literature there has been an emphasis on the use of Risk Assessment Models (RAMs) in which assessment is individualised to the patient, taking into account patient-related factors such as: age, obesity, obesity and medical history, in order to assess the patients’ risk of VTE and choose accordingly the necessary VTE prophylaxis, examples are the Caprini scale and recently published German S3 guidelines [3-6].

The use of antithrombotic medications has the potential to increase the risk of intraoperative as well as postoperative hemorrhage; therefore some clinicians are reluctant to use them despite their effectiveness [5].

Breast reduction is a commonly performed procedure in plastic surgery; the risk of VTE has been reported to be between 1% and 2.9% [4, 7, 8]. As it involves large tissue dissections through non-anatomical planes, it has the potential for intraoperative as well as post-operative hemorrhage [9].

At our institution we do not use a RAM for VTE prophylaxis; it has been chosen to treat all hospitalised patients using the same protocol. Nadroparin Calcium (Fraxiparine, GlaxoSmithKline, Zeist, the Netherlands) is administered subcutaneously preoperatively, and daily following surgery until patients are discharged; this offers an opportunity to assess the risk of hemorrhage associated with the preoperative administration of low-molecular-weight heparin (LMWH) in breast reductions.

MATERIALS AND METHODS

This study was performed in compliance with the institutional guidelines. Using the hospital electronic operation database, records were retrieved of all patients that had surgical procedures coded as a breast reduction or a mastopexy as inpatients, during a ten year period between 1 January 2001 and 31 December 2010.

We included all females who underwent a unilateral or bilateral procedure; males were excluded from this series as well as operations which were erroneously coded,
such as revisions of flap reconstruction or scar corrections. Patients with known
cogulopathies or using anticoagulative or antiplatelet therapy were also excluded.

At our institution Nadroparin Calcium is given to all inpatients, unless
contraindicated, once a day at 20:00; this regimen was chosen in order to ensure
standardisation and minimize the chance for non-compliance. Consequently patients
admitted for elective surgery will receive it for the first time the evening before surgery
(12-18 hours preoperatively) and daily following surgery, the first postoperative dose
being administered 4-10 hours postoperatively. This regimen is continued for the
duration of the hospitalisation, and LMWH is not used following discharge. The standard
dosage is 2850 anti-Xa international units. Mechanical thrombo-embolic prophylaxis
is not used. All breast reduction surgery is performed under general anesthesia;
vasoconstrictor infiltration is not used. Surgery is performed using monopolar cautery.
Hypotension is avoided in order to help identify any possible bleeding, and reduce
the risk of haematoma [10].

Data were acquired regarding: Patient demographics, medical history and
comorbidities, medicine use, weight and height, as well as the operation details
regarding the time of surgery, side, technique (pattern and pedicle), use of a drain,
and resection weight.

The main outcome measure was haematoma formation requiring reoperation;
ecchymosis and bruising were not included in accordance with the methods of
previous studies [11, 12].

Statistical analysis was performed using the paired 2 tailed student’s t-test or chi-
squared test as appropriate. A p <0.05 was considered significant.

RESULTS

Using the procedure codes for breast reduction 773 female patients were identified.

Following chart review 11 patients were excluded who were wrongly coded (flap
revisions and scar revisions), three had incomplete data, and one was treated with
Desmopressin for Hemophilia. Twenty-one patients did not receive preoperative LMWH
(15 aged ≤18 years, hospitalised in the pediatric wards and six same-day admissions).
Another 17 patients did not receive postoperative LMWH due to discharge on the day
of surgery.

A total of 720 patients (1358 breasts) fulfilled the inclusion criteria having received
preoperative and postoperative treatment with LMWH, 48 of the operations were
mastopexies. Reoperation due to haematoma formation was required for 37 breasts
in 37 patients (5.1% of patients and 2.7% of breasts). Eight patients (1.1%) required
transfusion due to symptomatic anemia. (Tables 1 and 2).

The average time between LMWH administration and surgery was 15 ± 2 hours
(range 12-18); the average time between the end of surgery and the administration of
the first postoperative dose of LMWH was 6.3 ± 1.9 hours (range 4-10). The average
The average hospital stay for patients requiring reoperation was 4.51 ± 1.42 as opposed to 3.18 ± 1.68 for patients without haematoma formation.

None of the patients was diagnosed with VTE.

Table 1. Comparison of the patient characteristics between patients who developed a haematoma to the patients that did not develop a haematoma

<table>
<thead>
<tr>
<th></th>
<th>Haematoma</th>
<th>No haematoma</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>37</td>
<td>683</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>40±14 (16-36)</td>
<td>39±13 (16-74)</td>
<td>0.617 (t test)</td>
</tr>
<tr>
<td>BMI</td>
<td>26±3.7 (18-35.6)</td>
<td>26.8±3.9 (18.4-47)</td>
<td>0.017 (t test)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>4 (10.8%)</td>
<td>63 (9.2%)</td>
<td>0.746 (Chi square)</td>
</tr>
<tr>
<td>Smokers</td>
<td>3 (8.1%)</td>
<td>115 (16.8%)</td>
<td>0.162 (Chi square)</td>
</tr>
</tbody>
</table>

Table 2. Comparison of the breast characteristics between patients who developed a haematoma to the patients that did not develop a haematoma

<table>
<thead>
<tr>
<th></th>
<th>Haematoma</th>
<th>No Haematoma</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>37</td>
<td>1321</td>
</tr>
<tr>
<td>Resection weight</td>
<td>486±258 (130-1092)</td>
<td>538±307 (28-2310)</td>
</tr>
<tr>
<td>Operated breast g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pedicle (Breasts)</td>
<td>Cranio medial 33 (89.1%)</td>
<td>Cranio medial 1020 (77.2%)</td>
</tr>
<tr>
<td></td>
<td>Medial 3 (8.1%)</td>
<td>Medial 120 (17.6%)</td>
</tr>
<tr>
<td></td>
<td>Cranio lateral 1 (2.7%)</td>
<td>Superior 86 (6.5%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Free nipple 23 (1.7%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cranio lateral 22 (1.7%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inferior 24 (1.8%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other 27</td>
</tr>
<tr>
<td>Pattern (Breasts)</td>
<td>Wise 36 (97.3%)</td>
<td>Wise 1177 (89.1%)</td>
</tr>
<tr>
<td></td>
<td>Vertical 1 (6.7%)</td>
<td>Vertical 138 (10.4%)</td>
</tr>
<tr>
<td></td>
<td>Other 6 (0.5%)</td>
<td></td>
</tr>
<tr>
<td>Drain</td>
<td>22 (59.5%)</td>
<td>619 (46.9%)</td>
</tr>
</tbody>
</table>
**DISCUSSION**

VTE and its prevention have been receiving increasing attention in recent years. Prophylactic modalities can be divided into behavioral, with early mobilization; mechanical with stockings or compression devices; and the use of medicines—thromboprophylaxis. The most commonly cited guidelines on VTE management and prophylaxis are published by the American College of Chest Physicians (AACP) and those do not include specific recommendations for plastic surgery. One of the important issues in VTE prophylaxis is the decision protocols used to decide which therapy should be used. The AACP recommends treatment according to the procedures being performed and stratifies them into minor surgery with a low risk of VTE to major surgery with a higher risk of VTE; the therapy used does not depend on individual patient characteristics, rather it is tailored to the group. In the Plastic surgery literature there has been an emphasis on the use of individual RAMs [3, 4, 13]. The AACP recommends against the use of individual RAMs and prefers to cluster patients according to the procedure they undergo[1].

At our institution we do not use RAM for VTE therapy. Instead all hospitalized surgical patients receive thromboprophylaxis with LMWH; this is given daily starting the day before surgery and continued until the patients are discharged. In the case of breast reduction surgery this can be considered to be in accordance with the recommendations of the AACP. We believe breast reduction should be considered major surgery. This is in accordance with criteria suggested by other authors, that is, surgery lasting longer than an hour and performed under general anesthesia [13, 14].

There is yet no agreement on the timing of thromboprophylaxis [5]. There is a long standing controversy between the European approach of preoperative administration of LMWH and the North American approach of initiating the therapy only following the surgery [15]. Reviews of the timing of LMWH administration in orthopedic surgery recommended against using preoperative LMWH in major orthopedic operations due to the increased risk of hemorrhage without an increase in the prevention of VTE [15, 16]. The guidelines for plastic surgery by Venturi also recommended starting thromboprophylaxis only more than 12 hours postoperatively [13].

**Table 3.** Comparison of patients who bled before the first postoperative Nadroparin dose (Early) to those who bled following the first postoperative dose (Late)

<table>
<thead>
<tr>
<th></th>
<th>Early</th>
<th>Late</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>16</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>42</td>
<td>38.14</td>
<td>0.63 (t test)</td>
</tr>
<tr>
<td>BMI</td>
<td>24.08</td>
<td>25.68</td>
<td>0.09 (t test)</td>
</tr>
<tr>
<td>Resection weight g</td>
<td>493</td>
<td>461</td>
<td>0.65 (t test)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>3</td>
<td>1</td>
<td>0.2794 (chi square)</td>
</tr>
</tbody>
</table>
Despite the fact that it has been proved to be effective, plastic surgeons underuse thromboprophylaxis [17, 18], often citing the risk of haematoma formation [4]. Patronella et al. reported on the use of thromboprophylaxis in aesthetic surgery and cautioned against its use in breast operations such as mastopexy and breast reduction that entail large dissections due to a higher incidence of haematomas [19]. Venturi et al. were concerned that the use of thromboprophylaxis on more patients instead of mechanical means may lead to more bleeding complications [13].

Postoperative haematoma formation is one of the major complications of breast reduction surgery; Hussien et al. reported a haematoma rate of 6.7 % with reoperation in 1.7% [10], Cunningham et al reported a haematoma rate of 3.7% in 179 patients in the BRAVO study, however there was no information on the diagnostic criteria [20]. Henry reported in 485 patients a haematoma rate of 5% of which 2.1% were defined as major requiring reoperation, he stressed the correlation between haematoma formation and uncontrolled intraoperative hypotension [21]. Knutsson et al reported 6.2 % postoperative bleeding and reoperation in a retrospective series of 258 patients [22]. Panuucci et al. reported reoperation rates for haematoma as high as 8.29% in the VTEPS study [9].

There have been reports concerning thromboprophylaxis for other plastic surgery procedures.

Panuucci et al. reported on the use of postoperative enoxaparin in plastic surgery patients, they reported no increased rate of haematoma formation requiring reoperation in patients receiving postoperative enoxaparin compared to controls [9]. Kim et al found no increased hemorrhage when enoxaparin was given pre and postoperatively for TRAM breast reconstruction compared to patients that received mechanical thromboprophylaxis. They reported a haematoma rate of 1.5%; however they reported a higher need for blood transfusion in the treated patients [23]. Liao et al found similar results when heparin was administered postoperatively for TRAM flap breast reconstruction [12]. This is contrary to the findings of other authors such as Durnig et al who reported a 16.2% incidence of haematoma when prophylactic LMWH was administered preoperatively for rhytidectomies [24]. Farkas et al., when examining perioperative enoxaparin use in body contouring, found an increased hemorrhage risk in the patients that received this medication compared to patients who did not receive such therapy [11]. Hussien did not find a significant difference in haematoma formation between patients who received preoperative heparin and those who did not; however it is important to note that unfractionated heparin was used in that study, which is known to have a lower bioavailability and to be less effective than LMWH [10]. Hatef et al. found a significantly higher rate of haematoma formation in post-bariatric patients who were perioperatively treated with enoxaparin compared to patients who did not receive it [7]. In the same study they also observed significantly longer operative times, intraoperative blood loss, and drain production.

Our finding of a 5.1% reoperation rate is within the range reported in the literature; it is plausible that this is a result of the thromboprophylaxis regimen that we use,
however the patients received the preoperative dose at least 12 hours before the surgery, a range which is considered safe. The t½ of Nadroparin is 3.79 ± 1.49. Most of the cases of postoperative haematoma 21 of 37 cases (56.7%) occurred after the administration of the postoperative dose; this was given on average 6.3 hours after the end of surgery, and it is possible that the early postoperative administration had more of an impact on the postoperative bleeding than the preoperative administration. Some of the patients had a haematoma after more than one dose of LMWH, and it may be speculated that a longer hospital stay is associated with a higher chance of haematoma formation; however, this cannot be ascertained from this study, since patients with a haematoma had a longer hospital stay which can be attributed to the management of their complication.

Our study is limited by its retrospective design. We compared our results to reports in the literature of bleeding complications in breast reductions; we did not use historical controls from our institution as they would be older than 15 years. We cannot comment on the hemoglobin decrease in our study group as a whole, as well as for the patients who had a haematoma since we do not routinely check hemoglobin levels preoperatively, as it is not required by our national guidelines. We did not observe any clinical cases of VTE, it is possible that there were such cases in our series that were not recognized, since VTE is often not diagnosed, and even pulmonary embolism is silent in a third of the patients diagnosed with DVT [3, 25].

Many surgeons and residents were involved in the patient care. It is possible that a part of the complications may be attributed to the fact that the study was performed in a teaching hospital, with less experienced surgeons experiencing a higher complication rate; however there are studies that refute this hypothesis [26].

A prospective study comparing patients receiving pre-operative LMWH to patients not receiving it could elucidate the contribution of the preoperative dose to haematoma formation, and it would be further interesting to compare between mechanical prophylaxis and thromboprophylaxis; however, in our setup this will constitute under-treatment and will be ethically unacceptable.

We believe that the risk of haematoma formation should be accepted because it outweighs the risks of mortality and morbidity associated with VTE [27]. As Davison eloquently stated “A haematoma is a medical stress, an inconvenience, an embarrassment, or an additional procedure, but rarely does it kill a patient. Thromboembolism that progresses to a pulmonary embolism kills the patient 50% of the time.” [28].

CONCLUSIONS

The use of a VTE prophylaxis protocol with administration of LMWH preoperatively and postoperatively less than 12 hours postoperatively is associated with a reoperation rate of 5.1%. This incidence is within the range reported in the literature. This administration protocol can be assumed to be safe.
REFERENCES


