Pre-Operative Low Molecular Weight Heparin: An Audit of Blood Loss During Orthognathic Surgery (Dual Centre)

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Introduction

Venous thromboembolism (VTE), including pulmonary embolism, is a preventable cause of morbidity and mortality in surgical patients. SIGN guideline 122 recommends all hospitalised patients be assessed for their risk of thromboembolism and bleeding, with mechanical and/or pharmacological prophylaxis prescribed accordingly [1]. Many tools exist for stratifying patients on the basis of their known risk factors [2-6], and these are commonly implemented by hospital surgical units to determine what prophylactic regimes are administered to their patients.

Orthognathic surgery is routinely carried out across the UK and is considered safe and predictable. It is commonly performed on an elective basis for healthy individuals where the risk of complications, including venous thromboembolism, is low. The Department of Health identifies a procedure time of greater than 90 minutes as carrying an increased risk of thromboembolism, and most orthognathic procedures meet these criteria. Patient-specific criteria that may also apply to orthognathic patients include obesity, oestrogen-containing contraceptives, thrombophilias, and family history of VTE [7].

Major haemorrhage is a well-recognised complication of orthognathic surgery [8], and pharmacological prophylaxis may increase this risk. There is very little evidence that supports or opposes routine use of pharmacological prophylaxis among this group of patients, and no current guidance could be found by the authors. This audit therefore aims to gather data from two maxillofacial units in the UK: Aberdeen Royal Infirmary, who routinely administer low molecular weight heparin prior to orthognathic procedures; and

Morriston Hospital in Swansea, who do not. In doing so we hope to determine whether routine pharmacological VTE prophylaxis shows clear benefit for orthognathic patients.

Methods

Orthognathic cases were retrospectively identified using operating schedules along with local records kept by the departments in Aberdeen and Swansea. Data was collected from both centres using a combination of online patient records, scanned operating documents, and written operating, anaesthetic, and nursing notes. Recorded data included age, sex, patient specific risk factors for VTE, procedure carried out, VTE prophylaxis used, contraindications to VTE prophylaxis, compliance with prescribed prophylaxis, intra-operative blood loss, intra-operative tranexamic acid administration, and any post-operative complications. The data was collated into summary tables for each department to allow easy comparison.

Results

Twenty-nine cases were included from each centre. Date of procedure ranged from September 2016 – December 2018 in Aberdeen, and from February 2019 – October 2019 in Swansea. Patient age ranged from 15 – 44. Mean age in Aberdeen was 23, with a median of 22. Mean age in Swansea was 22, with a median of 21. Males accounted for approximately two thirds of patients in Aberdeen (M:F ratio 1.6), and just over a third in Swansea (M:F ratio 0.4).

No contraindications to VTE prophylaxis were identified in either centre. Four patients from Aberdeen had risk factors recorded (all were currently taking oral contraceptive medication). Five patients from Swansea had risk factors recorded (three due to contraceptive medication, one with previous treatment for DVT, and one with severe obesity).

All patients in Aberdeen received TED anti-embolism stockings and a pre-operative dose of low molecular weight heparin (Dalteparin, 2500 or 5000 units depending on BMI) the night

prior to the procedure. All except one patient in Swansea received TED stockings, twelve (41%) wore Flowtron intermittent pneumatic compression devices intra-operatively, and two (7%) were prescribed post-operative chemoprophylaxis (one was given Tinzaparin, and one Enoxaparin). There was 100% compliance with the prescribed prophylaxis regimes across both centres.

Procedures carried out in Aberdeen were predominantly Le Fort I with bilateral sagittal split mandibular osteotomies (BSSO), with two patients undergoing Le Fort I osteotomy only, one undergoing BSSO with genioplasty, and one undergoing Le Fort I with BSSO and genioplasty. In Swansea ten patients underwent Le Fort I with BSSO (one with iliac crest bone grafting), ten underwent Le Fort I only, three underwent Le Fort I with genioplasty, and four underwent BSSO only.

Intra-operative blood loss in Aberdeen ranged from 300 – 1700ml, with a mean of 634ml and a median of 500ml. 15 cases (52%) were given intra-operative tranexamic acid. Intra-operative blood loss in Swansea ranged from 100 – 900ml, with a mean of 279ml and a median of 200ml. Intra-operative tranexamic acid was administered to 1 patient.

Post-operative complications were recorded in four (14%) patients from Aberdeen: one readmission 9 days following discharge due to prolonged epistaxis; one late surgical site infection; one haematoma (no treatment required); and one difficulty achieving haemostasis (no adjuvant treatment required). One (3%) patient from Swansea had a recorded post-operative complication – a surgical site infection at 4 weeks.

Discussion

The results of this audit seem to suggest that VTE chemoprophylaxis does not confer significant benefit to patients undergoing orthognathic surgery, and in fact may increase the likelihood of intra- or post-operative bleeding. The mean and median values for intra-operative blood loss more than doubled when chemoprophylaxis was administered, with the lowest recorded loss being greater than the average value without chemoprophylaxis. Intra-operative tranexamic acid was given to over half of the patients in Aberdeen, while

only one in Swansea. The patient cohort between the two centres is very similar in terms of age, contraindications, risk factors, and compliance with their prophylaxis regimes.

There are a number of important factors that impair the ability to draw meaningful conclusions from these results. Patient sampling was difficult in both institutions due to a combination of mixed recording methods (electronic and written), availability of patient notes, and frequency of relevant operations. This has resulted in a relatively small sample size from both centres, and a significant difference in procedure dates. The rarity of thromboembolic events intra- and post-operatively means this sample is likely too small to allow generalisation. Furthermore, the authors found that blood loss data was not available for some patients, meaning those patients had to be excluded which is likely to skew the results.

The operating surgeon(s), and therefore techniques and experience, will undoubtedly differ between the centres, which in itself may have an effect on the likelihood of intra-operative bleeding. The surgical procedures carried out showed some variation, which will also affect the likelihood of intra- and post-operative bleeding. With such a small number of cases it is impossible to adjust for this. No data has been recorded on pre-operative coagulation screening for this audit, so although there were no reported coagulopathies we cannot be sure this was verified with a venous blood sample.

Conclusion

The results presented here seem to suggest that VTE chemoprophylaxis confers little benefit to patients undergoing orthognathic surgery and may increase the likelihood of substantial blood loss. However, small sample sizes and significant confounding factors across a number of domains make the data unreliable. Ideally a prospective study would be carried out, designed in such a way as to reduce or eliminate these factors.

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