Assessing the Role of Topical Tranexamic Acid Application in Post-Reduction Mammoplasty Patients

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ABSTRACT

Introduction: Antifibrinolytic action of tranexamic acid by intravenous route reduces the need for blood transfusion and blood loss by about one-third in major surgery and trauma cases. However, risk of thromboembolism precludes its routine administration during surgery. This study assessed the topical application of tranexamic acid for reducing postoperative bleed onto a wound surface.

Material and Methods: Twenty five women undergoing bilateral reduction mammoplasty were selected. The wound surfaces on the test side were moistened with tranexamic acid just before closure, and saline was used as a placebo control on the other side. Production of drain fluid was measured for 24 hours post-surgery and pain was evaluated 4 hours after surgery and after 24 hours. Post-operative complications like infection, secondary bleeding and suture response were recorded.

Results: It was found that a topical application of tranexamic acid post operatively onto the wound surface significantly reduced drain fluid production by 42%. No adverse effects were observed. No significant differences could be registered in postoperative pain scores or post surgical complications.

Conclusion: It was concluded that a topical application of dilute tranexamic acid post-reduction mammoplastycan significantly reduce wound bleeding after surgery.

Keywords: Tranexamic acid; IV route; Mamoplasty

INTRODUCTION

Unwanted post -surgical bleeding may hamper the maintenance of adequate haemostasis in cases of major surgery and trauma. Among the antifibrinolytics, tranexamic acid is the most commonly used. It blocks the lysine-binding sites on plasminogen, preventing the activation of plasminogen to plasmin.[1] Tranexamic acid can be given orally or through intravenous route, but nowadays topical use is becoming increasingly popular.It has been shown that intravenous administration of tranexamic acid in cases of major surgery reduces the need for blood transfusion as much as by 32–37 per cent, and postoperative bleeding by 34 percent.[2] Single intravenous doses suggested in various studies are 1–2 g.[2] Major safety concerns as thrombosis and renal impairment are associated with higher doses.[3] Due to the associated uncertainty about the vaso-occlusive effect of tranexamic acid, it cannot be recommended for regular use during most surgical procedures.[4] Nowadays, topical application of tranexamic acid has been seen to provide a high drug concentration locally and vice versa.[5,6] Studies have shown an equal effect of topical compared with intravenous tranexamic acid on both post-operative bleeding and requirement for transfusion.[7,8] No adverse effects or drug interactions have not been reported with topical use.

Thus, this study was to assess whether moistening of a wound surface with tranexamic acid can reduce post-operative bleeding in women undergoing bilateral reduction mammoplasty.

MATERIAL AND METHODS

Study was done in the department of Surgery,Career institute of medical sciences, Lucknow after ethical approval from the institutiona and written informed consent from subjects. Twenty five women above 25 years of age undergoing bilateral reduction mammoplasty were selected for the study based on inclusion exclusion criteria. Exclusion criteria were a history of present or familial thromboembolic disease, pregnancy or severe co-morbidity and subjects using anticoagulants. Informed consent was obtained from all participants before inclusion in the study.

The women received topical tranexamic acid application to one breast and a placebo to the other after reduction mammoplasty. All personnel involved in surgery and postoperative follow-up were blinded to the study. The tranexamic acid was diluted only to a volume sufficient to moisten a fairly large wound surface to ensure a sufficiently high concentration at the site of wound: 20ml moistens at least 1500 cm^2. The prepared solution contained 20ml of 25mg/ml tranexamic acid. The other side received saline as placebo.

Two surgeons carried out the operation on one breast each. Local anaesthetic was injected into the breasts at the end of surgery. The contents of the suitable bottles containing tranexamic acid or placebo were spread on to the wound surfaces before closure. Vacuum drains were then placed symmetrically and the wounds were closed with subcutaneous suturing. No routine thrombophrophylaxis was performed and the patients received oral analgesics after surgery.

Post-operatively, drain fluid volume was recorded 24 hours after surgery and drains were removed when production was below 50 ml per 24 hour. Another outcome recorded was postoperative pain, which was registered for each breast 4 hours after surgery and 24 hours after surgery, using a visual analogue scale from 0 (no pain) to 10 (unbearable). Medical and surgical serious adverse events were recorded at the scheduled follow-ups.

STATISTICAL ANALYSIS

Data were recorded as mean±s.d. or median as appropriate.

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How to cite this article: Saurabh Pathak, Ayanat Husain, Satendra Sharma, Huma Firdaus, Anurag Share. Assessing the role of topical tranexamic acid application in post-reduction mammoplasty patients. International Journal of Contemporary Medical Research 2016;3:1529-1531.

Differences in drain fluid volume and pain between breasts were examined using a paired Wilcoxon signed-rank test. Differences in variables between groups were evaluated with Fisher's exact test. P <0.050 was considered significant. All analyses were done using SPSS® version 22.0.

RESULTS

Twenty-five women were selected eligible for final study; the mean age was 43 (25–67) years. None of the women used platelet inhibitors or anticoagulants.

S. No.	Tranexemic Acid Group (ml)	Placebo Group (ml)
1	10	25
2	8	17
3	7	6
4	6	13
5	13	12
6	21	35
7	10	8
8	4	29
9	15	37
10	14	17
11	18	22
12	21	26
13	21	29
14	17	19
15	13	29
16	23	44
17	12	35
18	15	37
19	13	38
20	13	31
21	12	42
22	17	15
23	16	25
24	13	13
25	8	17

Table-1: Comparison of production of drain volume after 24 hours among the two groups

Drain production was found to be 42 per cent lower in breasts that were treated with tranexamic acid as compared to the placebo (P=0.026) (Fig 1).

Pain scores were similar in breasts treated with tranexamic acid or placebo on the day of surgery (median 3.5 (0–6) versus 3.0 (0–6); P=0.183) and after 24 h (1.5 (0–6) versus 2.0 (0–6) respectively; P=0.568). No adverse effects were recorded after topical tranexamic acid.

DISCUSSION

The present study clearly showed that a topical application of tranexamic acid after reduction mammoplasty significantly reduced wound drainage. Wounds on the surface can usually be assorted (burns,massive weight loss surgery), and it is often difficult to devise a study with correspondent wounds. Females undergoing bilateral reduction mammoplasty provide almost identical wounds in a usual clinical setting.

The overall reduction recorded in drain fluid production of about 42 per cent after topical administration of tranexamic acid here is in accordance with previously published studies[7,8] which regularly reported a reduction in need for transfusion.

This present study opted for a higher concentration of 25mg/ml, but still it was dilute enough to provide a volume sufficient to moisten large surface areas. Few published studies have a similar mode of application comparable to the moistening used in the present study. A mouthwash containing 4.8mg/ml tranexamic acid was found to be effective after dental extraction[9], however Hinder and Tschopp[10] found no significant effect of use a gargle containing 1.7mg/ml tranexamic acid solution post-tonsillectomy. Athanasiadis et al[11] reported a significant hemostatic effect after spraying the wound surfaces with tranexamic acid in cases of endoscopic sinus surgery. The optimal concentration, however, remains unknown.

Tranexamic acid is not at all expensive. Its cost-effectiveness has been thoroughly documented in literature pertaining to general as well as orthopaedic surgery.[12] Even in operations where bleeding is less common, topical application of

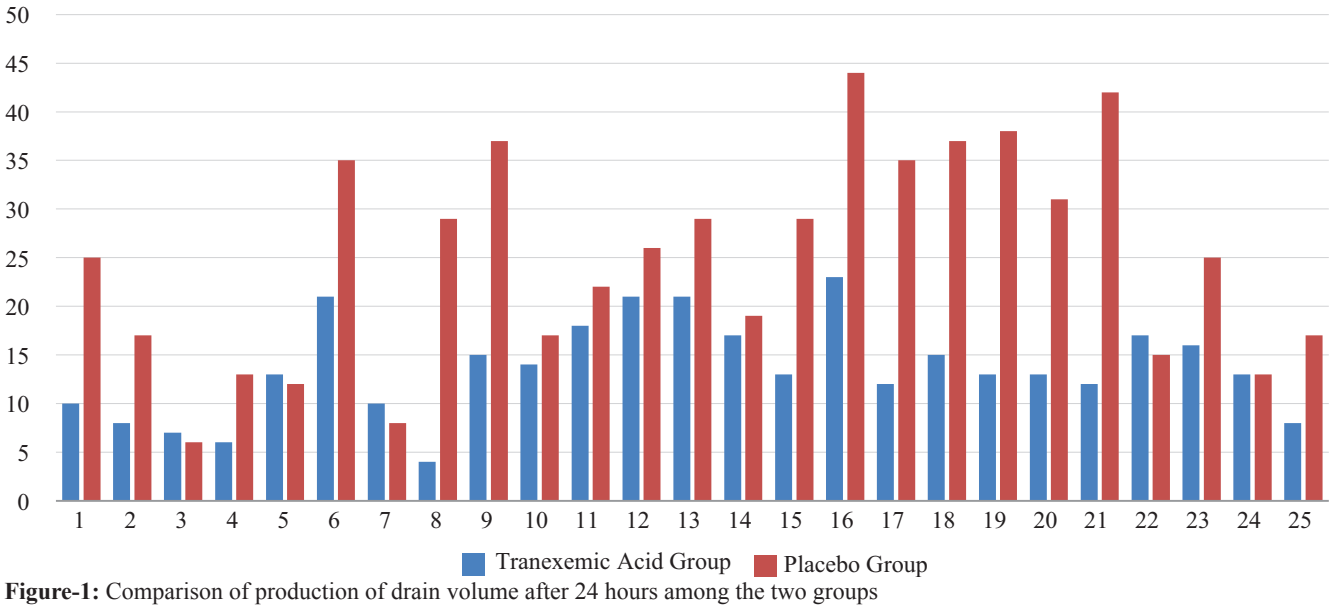

Figure-1: Comparison of production of drain volume after 24 hours among the two groups

tranexamic acid post – operatively can reduce the need for drains and outpatient visits. This simple method has potential for improving post-operative wellness of the patient and hence can be recommended for widespread application after surgery.

CONCLUSION

The present study suggests that topical tranexamic acid can significantly reduce production of drain fluid after reduction mammoplasty cases to below the cut-off value in almost all patients, and thus in future may obviate the need for a drain.

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Source of Support: Nil; **Conflict of Interest:** None

Submitted: 16-03-2016; **Published online**: 17-04-2016