

Haemostatic effect of topical application of saline adrenaline versus cold saline and tranexamic acid in nasal surgeries (Comparative Study)

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ABSTRACT

Background: Bleeding is a mutual problem faced during the surgical operation FESS (Functional Endoscopic Sinus Surgery) which increases the hazard of adjacent vital elements damage by the reduction of the surgeon's range of view .

Objective: The current work demonstrated for assessment and comparison among topical saline-adrenaline, cold saline and tranexamic acid as substitutions to local vasoconstrictors on bleeding and quality of the surgical area within FESS.

Patients and methods: the present work was a prospective randomized controlled study that was demonstrated on 84 cases with class I & II of ASA (American Society of Anesthesiologists), scheduled for selective FESS exposed to a general anesthesia. The studied Cases were categorized into 3 groups, each one of them consists of 28 cases, during the FESS operation group A used topical tranexamic acid (1000mg diluted in 100ml normal saline) group B used saline-adrenaline (1:20000) and group C used cold saline (2 - 8°C) for irrigation and packing.

Results: it was found that when using of local saline-adrenaline, it led to significant rise in the average pressure of artery (81.3 torr) in first 10 minutes after insert topical packs and corrected by anesthesiologist by hypotensive drugs in comparison with other two groups. saline-adrenaline have an advantage in the reduction in the surgical period (60.6 minutes); which increase the quality of surgical area , surgeon satisfaction and decrease blood dissipation(174 ml) in comparison with the other two studied groups.

Conclusions: The use of local saline-adrenaline have an advantage in the reduction in the duration of operation that leading to decrease the blood loss and increase the quality of the surgical field with no complications in the hemodynamics during FESS more than other studied group.

Keywords: Functional; bleeding; FESS; endoscopic; adrenaline; tranexamic acid.

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INTRODUCTION

A restrictive problem in nasal operations was the difficulty in employing the surgical tools in the nasal fossae and obtaining a clear image of the surgical area. The main faced limiting problems were that there is no sufficient view of surgeons because of the tight and tortuous anatomy of nasal fossa, and bleedings of the mucosa due to the wide spread of vascularization in this area. Nasal endoscopic surgery, which was started in the early 1970, substantially minimized the obstacles mentioned before. Endoscopes have some advantages in that it can reach difficult areas; magnify the surgical area view, and providing the advantage of angular optics,

which help surgeons to reach inaccessible recesses. While, the surgeons were directed via an endoscopic picture, any minor bleeding can screen the endoscope tip leading to the blocking of the endoscope image. Thus, hemostasis of the nasal mucosa, which was already important, has become major for operation.¹

General anesthesia together with hypotensive drugs such as beta-blockers, vasodilators, higher dose of inhalational or intravenous anesthetics would help for accurately recognize complex nasal anatomical structures. A combination of all of these drugs were used with high dose, which may lead to undue complications after operation.²

Therefore, the standard practice for hemostatic purpose during nose surgery is routinely using local infiltration of saline- adrenaline as a way to improve the field of visibility.³

It was found that cooling has a promising effect in different vascular structure at all levels and also able to cause a reflex on vasoconstriction. The reason of this was unclear but there were some proposals were suggested for illustration. One proposal is that vasoconstriction happens because the cooling lead to raise the firing of sympathetic nerve fibers within the cooled tissues. Different opinion concluded that vasoconstriction occurs by direct tissues cooling influencing the blood vessels themselves but, it is found that the blood flow in the cooled tissues (at 18°C) was reduced by vasoconstriction. As the cooling continues, at about (2°C), vasodilation happens in a physiological attempt to raise the blood flow that prevents damage of the tissue. This is called a Hunting Reaction phenomenon.⁴

TA (Tranexamic Acid) is an anti-fibrinolytic agent that blocks the lysine binding sites on plasminogen, leading to stop the reaction of plasminogen and the heavy chain of plasmin with lysine remains on the surface of fibrin. Some studies have concluded that there was a good performance of topical and oral forms of TA in performing hemostasis and improving the field of nasal operation.⁵

PATIENT AND MATERIALS

According to the guidelines of the ethics committee, a clear written agreement was obtained from all cases.

A number of 84 cases wereselected with bilateral CRS with/without polyp, both gender, with age ranging from 20 to 60 years, and distributed according to American Society of Anesthesiologists (ASA) class I&II selected from ENT department for functional endoscopic sinus surgery.

Inclusion criteria: bilateral chronic sinusitis with or without polyps, weight range from 60 to 99 kg, age range from 20 to 60 years.

Exclusion criteria: age out of the range 20-60 years, not oriented with unstable mentality, cardiac or coagulation diseases, pregnant or breast-feeding women and unilateral or previous FESS surgery.

Patients were categorized into 3 groups, each one of them consists of 28 cases, during the FESS operation group A used topical tranexamic acid (1gm diluted in 100 mL normal saline) group B used saline-adrenaline (1:20000) and group C used cold saline (2 - 8°C) for irrigation and packing.

Preoperatively: the patients have a systemic examination and routine blood evaluation including CBC (Complete Blood Count), PT/PTT (Prothrombin / Partial Thromboplastin Time), serum creatinine, urea; RBC (random blood sugar), SGOT, SGPT and ECG were done.

Intraoperatively:All patients were treated by fentanyl of concentration (2 mg/ kg) and midazolam of concentration (0.02 mg/ kg). After supervision, anesthesia induction with propofol of concentration (2 mg/ kg), lidocaine of concentration (1.5 mg/ kg) and atracurium of concentration (0.5 mg/kg) was given earlier intubation. At the start of the surgery, nasopharyngeal pack with gauze was employed to block blood from reaching the pharynx and topical nasal packs inserted for 4 minutes before start the operation. Isoflurane inhalation and muscle relaxant have an effect on preserving anesthesia. Mean arterial pressure (MAP) was kept in the range (60 - 70) torr using nitroglycerine infusion (5–10) µg/ kg/min.

Postoperatively, muscle relaxant was inverted using neostigmine of concentration (0.05 mg/ kg) and atropine of concentration (0.02 mg/ kg). Hemodynamic factors like MAP and beat rate of the heart were monitored every 10 minutes. Blood wastage within the surgery was estimated from the blood-soaked mops, gauze pieces, and in suction bottles after discounting of the irrigation fluid. The operation area was cleared of blood and then graded by the surgeon. The surgeon follows the (wait & watch) way with the help of endoscopy during and at the termination of the operation to find fresh bleeding. Blinded surgeon's satisfaction about reduction of bleeding intraoperatively was estimated and the significant was evaluated.

RESULTS

The current study was demonstrated on 84 cases of E.N.T operations. According to age there were no statistically significant changes among the studied groups (table 2).

According to sex, no statistically significant change was found among the studied groups (table 3).

There was a statistically significant elevation in the average arterial blood pressure in the first 10 minutes after insert topical packs and corrected by hypotensive drugs between groups II in comparison with groups I and III while there was no statistically significant change among group I and III (table 4).

Regarding the bleeding score, there was a statistical decrease in it for groups II in comparison with group I & III while there was no statistically significant change among group I & III (table 5).

According to amount of blood loss during operation there was a statistical decrease in the amount of intraoperative blood lost in group II in comparison with group I & III. While there was no significant difference change among group I & III (table 6).

According to surgeon satisfaction, there was a statistically significant increase in the percentage of satisfied surgeons in group II in comparison with

those of group I & III while there was no statistically significant change between group I & III regarding surgeon satisfaction (table 7).

According to duration of operation there was a statistical decrease in operation time in group II versus group I & III while there was no significant change in operation time when comparing group, I & III (table 8).

0 No bleeding (cadaveric conditions)
1 Slight bleeding: no suctioning required
2 Slight bleeding: occasional suctioning required
3 Slight bleeding: frequent suctioning. Bleeding threatens surgical field a few seconds after suction is removed
4 Moderate bleeding: frequent suctioning required and bleeding threatens surgical field directly after suction is removed
5 Severe bleeding: constant suctioning required; bleeding appears faster than can be removed by suction; surgical field severely threatened and surgery usually not possible

Table 1: Grading scale for scoring of surgical field bleeding Grades Assessment

	Group I	Group II	Group III
Range	20-54	25-60	20-51
Mean±S.D	38.4±10.6	39.7±9.6	35.4±10.1
P ₁	0.738 (NS)		
P ₂	0.260 (NS)		
P ₃	0.450 (NS)		0.450 (NS)

Table 2: Age distribution in groups of the study

Sex	Group I		Group II		Group III	
	No	%	No	%	No	%
Male	18	64.3	16	57.1	16	57.1
Female	10	35.7	12	42.9	12	42.9
P ₁	0.231 (NS)					
P ₂	1.00 (NS)					
P ₃	0.231 (NS)				0.231 (NS)	

Table 3: Sex distribution in groups of the study

	Group I	Group II	Group III
Range	50-65	70-88	50-75
Mean±S.D	56.1±8.3	81.3±6.2	66.6±7.2
P ₁	0.021 (S)		
P ₂	0.031 (S)		
P ₃	0.648 (NS)		0.648 (NS)

Table 4: Mean arterial blood pressure(torr) in groups of the study

	Group I	Group II	Group III
Range	2-4	1-3	2-4
Mean±S.D	3±0.4	1.9±0.5	3±0.6
P ₁	0.024 (S)		
P ₂	0.024 (S)		
P ₃	1.0 (NS)		1.0 (NS)

Table 5: The score of bleeding in groups of the study

Amount of Blood loss	Group I	Group II	Group III
Range	170-300	120-200	220-400
Mean±S.D	245±56.4	174±22.4	289±46.5
P ₁	0.000 (S)		
P ₂	0.021 (S)		
P ₃	0.574 (NS)		0.574 (NS)

Table 6: Intraoperative blood loss (ml) in groups of the study

Surgeon satisfaction	Group I		Group II		Group III	
	No	%	No	%	No	%
Satisfied	6	21.4%	18	64.3%	6	21.4%
Unsatisfied	22	78.6%	10	35.7%	22	78.6%
P ₁	0.031 (S)					
P ₂	0.031 (S)					
P ₃	1.0 (NS)				1.0 (NS)	

Table 7: Surgeon satisfaction in groups of the study

	Group I	Group II	Group III
Range	70-94	50-70	60-95
Mean±S.D	81.4±7.8	60.6±5.2	83.7±10.2
P ₁	0.022 (S)		
P ₂	0.024 (S)		
P ₃	0.498 (NS)		0.498 (NS)

Table 8: The operative time (min.) in groups of the study.

DISCUSSION

Bleeding is a common unescapable complication as a result of a disturbed vision of injured vessels of the blood. The magnified picture of the surgical area in FESS convert a small drop of blood into a lake. Bleeding during FESS may bother the surgeon view so; the surgeon commonly uses a suction that increase the risk of increased surgical area manipulation, longer surgery duration leading to more bleeding. It also boosts the danger of potential harmful of the blood vessels of eyes and hazards within the skull. The prime reason of bleeding within the FESS is the capillaries, so the average pressure of the arterial blood may influence the bleeding strength.⁶

Günel, et al⁶, in their study concluded that the topical usage of adrenaline lead to big rise in mean arterial blood pressure as a peaks after 10 minutes after topical nasal packs which runs in line with our results and infiltration more than topical use.⁷

Baradaranfar, et al⁸, in their study found that there was no statistically significant change among tranexamic acid and saline in bleeding score which was in agreement with our results.⁸

Günel, et al⁶, found in their study that the adding of adrenaline locally leads to decrease the quantity of blood dissipation during nasal operations which run in lines with our results.⁷

In our study, no difference was found regarding complications. Baradaranfar, et al⁸, in their study found that there was no statistically significant change among the two groups of (Saline and Tranexamic acid) of the study regarding operative complications which was in agreement with our results.⁸

Junior, et al⁹, in their study found that topical saline-adrenaline cause operative complication such as arrhythmia with high concentration of adrenaline 1:2000 which conflict with our results.⁹

Lee, et al¹⁰, found in their study that the use of adrenaline decrease the operative time which agree with our results.¹⁰

CONCLUSION

Bleeding within the FESS operation is a big problem challenging a surgeon. Topical application of saline-adrenaline (1:20000) has a significant decrease in blood loss and operation time and increase surgeons satisfaction without hemodynamic complications when compared with use of topical tranexamic acid (1g/100 ml) or cold

saline (2-8°C) which increase operation time and blood loss and don't improve surgical field. Not recommended to replacing saline- adrenaline by tranexamic acid and cold saline in this concentration.

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