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Original Research Article

An observational study comparing the effect of sphenopalatine artery block on bleeding in endoscopic sinus surgery

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ABSTRACT

Background: The use of the sphenopalatine artery block to reduce bleeding during FESS, has been a debatable issue. This cross sectional observational study aims to study whether sphenopalatine artery block has any significant effect on bleeding.
Methods: 55 patients coming to the ENT department of Stanley Medical College from 2015–2016 were included in this study. All patients had bilateral nasal sinus disease and endoscopic sinus surgery was performed on both sides. 20 minutes prior to surgery one side was chosen randomly and sphenopalatine artery block was administered via the greater palatine canal approach. A mixture of lignocaine (2%) and adrenaline (1:80000) was used for infiltration. The surgery was done in an alternating fashion where the surgeon would operate for 15 minutes on one side and then moved onto the other side. The field was graded using the Wormald Grading at 30 minute intervals. The results were tabulated and the Wilcoxon Signed Rank Test was done at each time interval to see if there was a statistically significant difference in the grades of bleeding on both sides at each time interval. SPSS version 22.0 was used to analyse the data. Significance level was fixed as 5% (α=0.05).
Results: It was found that for each time interval up to 120 minutes there was a significant decrease in the bleeding on the blocked side. However after 120 minutes the bleeding on both sides appeared to be same.
Conclusions: Sphenopalatine artery block given prior to surgery will be effective in reducing bleeding in FESS for the first 2 hours after which the effect of the block wears away.

Keywords: FESS, Sphenopalatine, Palatine, Lignocaine, Adrenaline, Bleeding

INTRODUCTION

The sphenopalatine artery is the main feeding vessel to the lateral wall of nasal cavity and most of the septum.[1] Blocking this artery is believed to reduce the amount of bleeding, and thereby enhancing the visibility during surgery.[2] The block involves injecting a local anesthetic–lignocaine, along with a vaso constrictive agent–adrenaline into the pterygopalatine fossa. This study aims to assess if there is any significant difference in bleeding, during FESS, with and without the block.

METHODS

55 patients (male and female in the age group of 20-45 years) with chronic bilateral sinusitis who attended the ENT out-patient department and were planned for endoscopic sinus surgery on both sides, during the period March 2015 to August 2016, who satisfied the inclusion criteria were enrolled for the study after getting an informed written consent.

***Study design*:** Cross sectional observational study.

***Study place*:** Department of ENT, Government Stanley Medical College and Hospital.

***Study period*:** March 2015 to August 2016.

***Sample size*:** 55 patients

Inclusion criteria

Inclusion criteria were all patients between ages 20 yrs and 45 yrs; bilateral chronic sinusitis or bilateral sinus disease requiring the same procedure in both nasal cavities.

Exclusion criteria

Exclusion criteria were patients with unilateral disease; patients with systemic hypertension; patients taking anti-coagulant drugs or medication affecting their coagulation profile; patients having bleeding or clotting disorders; patients below 20 yrs of age or above 45 yrs; patient known to have allergic reactions to lignocaine; patients having undergone nasal surgery previously; patients whose intra op BP rises above 130 mmHg systolic and 80 mmHg diastolic at any point during surgery; patients operated by more than 1 surgeon; patients undergoing septal correction and if septal correction is started prior to FESS on both sides; patients assessed under PSA II and greater.

Table 1: The Wormald grading system for bleeding during endoscopic sinus surgery.

Grade	Surgical field
0	No bleeding
1	1–2 points of ooze
2	3–4 points of ooze
3	5–6 points of ooze
4	7–8 points of ooze
5	9–10 points of ooze (sphenoid fills after 60 seconds)
6	>10 points of ooze, obscuring surface (sphenoid fills between 40–60 seconds)
7	Mild bleeding/oozing from entire surgical surface with slow accumulation of blood in postnasal space (sphenoid fills in 40 seconds)
8	Moderate bleeding from entire surgical surface with moderate accumulation of blood in postnasal space (sphenoid fills in 30 seconds)
9	Moderately severe bleeding with rapid accumulation of blood in postnasal space (sphenoid fills in 20 seconds)
10	Severe bleeding with nasal cavity filling rapidly (sphenoid fills in <10 seconds)

Being an observational study the sample size is not defined prior to the study. All patients fitting the inclusion criteria during the study period are included in the study.

For all patients undergoing an endoscopic sinus surgery a computed tomography of the paranasal sinuses were taken. If the same procedure was planned on each side then the patient was included in the study.

Prior to surgery each patient was routinely tested for hypersensitivity to the infiltration solution i.e. lignocaine with adrenaline (2% lignocaine and 1:80000 adrenaline). This was done by injecting 0.2 ml of the solution intradermally on the right forearm of the patient and then testing for induration, erythema or other signs of local hypersensitivity reaction after 30 minutes and then again after 120 minutes. Those patients showing sensitivity to the mixture were excluded from the study.

The sphenopalatine artery block

Figure 1: Showing the equipment needed for the sphenopalatine artery block.
1: Gloves, 2: Cotton, 3: Headlight, 4: 2 ml syringe with needle bent to 45 degrees, 5: Jobson Horne ear Probe with cotton, 6: Gauze, 7: Lignocaine and adrenaline solution for infiltration.

This was given via the intra oral route for all patients. The patient was then kept in supine position and was asked to keep the mouth open continuously until the block is given. The tongue depressor maybe used in certain patients whose palates are difficult to visualize. Sterile gauze is the used to wipe the saliva off the hard palate. A wick of cotton is threaded around the Jobson Horne ear probe and using this greater palatine foramen is probed for.

The greater palatine foramen has a constant location posteromedial to the third maxillary molar and anteromedial to the maxillary tuberosity and pterygoid hamulus.[3] When probing in this region, a distinct depression can be noted. 2 ml of the infiltration is loaded into a sterile 2 ml syringe with a 25 gauge needle. The needle is bent to about 45 degrees about 25 mm from the tip.[4] This helps in easily manoeuvring the needle into the canal. Keeping the tip of the probe within the palpated

depression, the tip of the needle is inserted and 0.1 ml of infiltration is given submucosally so that the area is anesthetized while probing for the canal. With negative pressure the canal is probed for and when it is found the needle easily slips in. Aspiration of any air or blood indicates wrong positioning.[5] If so the needle is withdrawn and repositioned. The needle is inserted for about 25 mm into the canal. The 2ml of block is then very slowly injected into the pterygopalatine fossa. Bleeding during the procedure is usually very minimal. For 3 patients the greater palatine foramen could not be correctly identified and so the procedure was abandoned and these cases were excluded from the study. 8 patients complained of persistent numbness over the teeth on the side of the block. This however returned to normal in all these patients within the first 24 hours post-surgery. The block maybe given after intubation under general anaesthesia or prior to intubation in the pre op room. Whether given under general or local anaesthesia the aim was to give the block 20 minutes prior to the onset of surgery. Vitals were constantly monitored throughout the procedure.

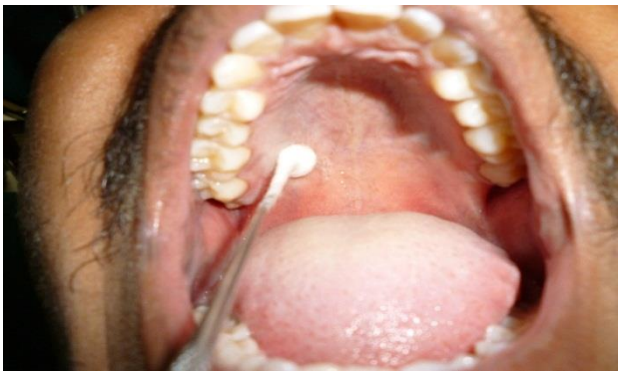

Figure 2: The right greater palatine foramen is being probed for using the Jobson Horne probe.

The side of the block was decided randomly. The surgeon or the person grading the field during the surgery was unaware of the side being blocked.

Grading the field

The endoscopic sinus surgery for patients included in this study was done in a "ping-pong" fashion. Patient was operated for 15 minutes first on a side that is chosen by the surgeon. He/she was not aware of which side was blocked. After completing 15 minutes on one side the then surgeon moved on to operate on the opposite side for 15 minutes and after which a saline wash was given on both sides and the field graded for the 30 minute mark. This was done alternatively until the surgeon completes the surgery on both sides. Readings were obtained for every 30 minutes of surgery. The maximum time for which a patient was operated was 3 hours (180 minutes) and the minimum time was one and half hours (90 minutes).

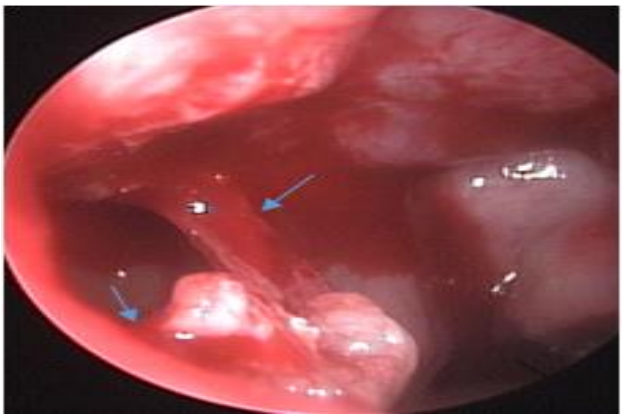

Figure 3: Intraoperative picture showing 2 points of ooze i.e. grade 1 bleeding.

The intra operative parameters are assumed to be kept at a constant for every 30 minute intervals. If the intra operative blood pressure were to rise above 130 mmHg systolic and 80 mmHg diastolic at any point during surgery, then that case was excluded from the study. The use of gauze packs impregnated with vasoconstrictors or decongestants were completely avoided for all cases included in this study, both pre and intra operatively. No local infiltration was also given other than the initial sphenopalatine block on one side

To compare between blocked and non-blocked sides at each time point Wilcoxon signed rank test was applied. SPSS version 22.0 was used to analyse the data. Significance level was fixed as 5% (α=0.05).

RESULTS

A total of 55 patients were included in the study. Out of which 27 were female and 28 were male. The following table shows the average grades of bleeding for each time interval in the blocked and unblocked side.

Table 2: Average grade of bleeding at each time interval.

Side	30 min	60 min	90 min	120 min	150 min	180 min
Unblocked side	1.704895	2.920629	4.135664	5.604575	7.361111	8
Blocked side	1.699109	2.919073	4.138324	5.592593	7.361111	8

The normality tests Kolmogorov-Smirnov and Shapiro-Wilks tests results reveal that the variables do not follow normal distribution. Therefore to analyse the data non-parametric methods are applied. To compare between blocked and non-blocked sides at each time point Wilcoxon signed rank test is applied. SPSS version 22.0 is used to analyse the data. Significance level is fixed as 5% (α=0.05).

Table 3: Statistical analysis of results.

Time point	Z value	P value
30 mins	2.524	0.012
60 mins	3.53	<0.001
90 mins	3.13	0.002
120 mins	2.982	0.003
150 mins	1.414	0.157
180 mins	0	1
Average grading	5.212	<0.001

The Wilcoxon signed rank test was used at each time interval to know if there was any significant difference in the bleeding on the blocked and unblocked side. The level of significance was fixed at p≤0.05.

For the time interval starting from 30 minutes to 120 minutes the P value was less than 0.05. This indicates that for each of the readings i.e. 30 min, 60 min, 90 min, and 120 min the grades of bleeding on the unblocked side were significantly higher than those on the blocked side.

However after 120 minutes this difference ceases to exist. At time points 150 minutes and 180 minutes there seems to be no significant difference in the bleeding on both sides.

The line graph below shows the mean grades of bleeding on both sides (Y– axis) plotted against each time interval (X– axis). It can be seen graphically that there is a small but definite gap between the blocked and unblocked sides which disappears after 120 minutes.

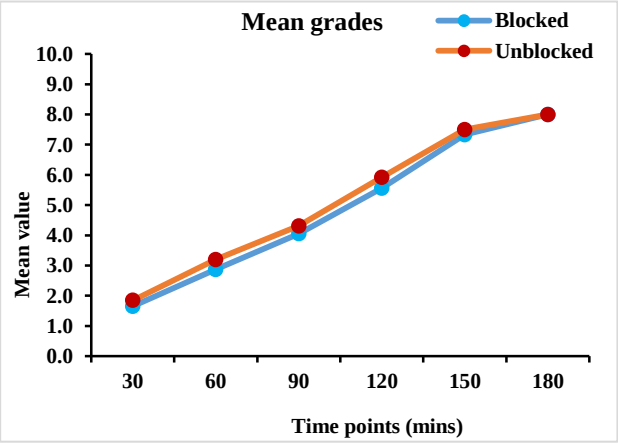

Figure 4: Graph of mean grades against each time interval.

The Wilcoxon signed rank test was also done to see if there was a significant difference in the average grades of bleeding on each side. This also has a p value less than 0.05 showing that overall the bleeding on the blocked side is lesser than the unblocked side. The bar chart below shows the difference between the average grading overall on both sides.

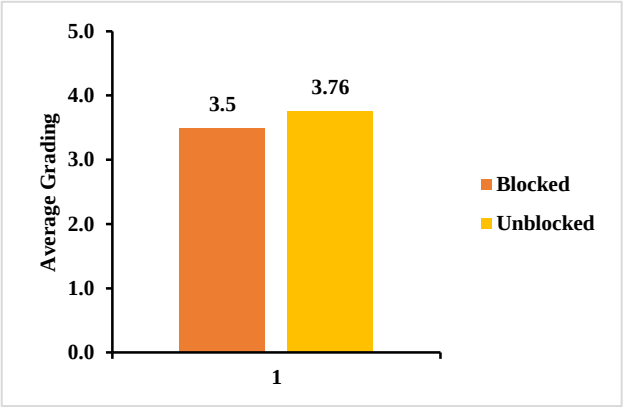

Figure 5: Bar chart showing average grade of bleeding in blocked and unblocked side.

DISCUSSION

The above results and observations indicate that when sphenopalatine artery block is given via the greater palatine route using a combination of lignocaine and adrenaline there is a significant difference in the bleeding between the sides. The effect of the block however gradually wears away over a period of 2 hours. After this period the bleeding between the sides were almost similar. This could be because with time the vasoconstrictor and aesthetic is gradually absorbed into systemic circulation and hence does not produce vaso-constriction of the sphenopalatine vessels.

The sphenopalatine artery is the major blood vessel supplying the lateral wall of the nose as well as the septum. The injection of a vasoconstrictor and lignocaine around this vessel's main trunk results in transient vasoconstriction and so reduced blood flow.[5] This probably accounts for the difference in bleeding seen.

A probable source of error in this study and also its limitation is that we are comparing the results on the same individual. Hence block given to one side gradually may diffuse to the opposite side as well and result in vasoconstriction on that side too, through the extensive vascular anastomosis in the nasal mucosa. This may alter the results by showing a falsely low bleeding on the unblocked side.

Another probable source of error is that after the surgeon finishes 15 minutes on one side he moves onto the opposite side for the next 15 minutes. During this time the first side is left undisturbed. This side may show an abnormally low grade of bleeding due to haemostatic

mechanisms kicking in. Hence when taking the reading at the end of 30 minutes the side finished second will most show greater bleeding. This source of error is for a certain degree accounted for by giving a saline wash on both sides before grading the field.

A review of literature also suggests results consistent with this study. A study by Wormald et al showed a small but significant reduction in bleeding during FESS using this block.[2] Salah et al also concluded that sphenopalatine artery block improves surgical field and improves post op analgesia.[6] Others like Hassan et al have reported similar findings.[7]

In conclusion, even while keeping in mind the above limitations of this study, there seems to be a statistically significant difference in bleeding in FESS when using the sphenopalatine artery block and can be safely and routinely used for improving surgical field during FESS.

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