



Received on 11 July 2024; received in revised form, 25 August 2024; accepted, 24 October 2024; published 01 December 2024

## OUR EXPERIENCE OF USING TOPICAL HAEMOCOAGULASE (BOTROCLOT) IN ARRESTING EAR, NOSE, THROAT AND HEAD AND NECK BLEED IN A TERTIARY CARE CENTER

Meenakshi Kekre <sup>1</sup>, Abhiraj Tiwari <sup>\*1</sup>, Smriti Saxena <sup>1</sup>, Ananthula Mohan Krishna <sup>2</sup>, Piyush Sinha <sup>1</sup> and Suman Chandrakar <sup>1</sup>

Department of Otorhinolaryngology <sup>1</sup>, Shri Shankaracharya Institute of Medical Sciences, Bhilai - 490020, Chhattisgarh, India.

DNB ENT, Shree Krishna ENT Care and Hearing Center <sup>2</sup>, Sircilla - 505301, Telanagana, India.

### Keywords:

Topical haemocoagulase, Botroclot, Botrops jararaca/atrox, Fibrin, Fibroblast migration, Wound healing

### Correspondence to Author:

**Dr. Abhiraj Tiwari**

Assistant Professor,  
Department of Otorhinolaryngology,  
Shri Shankaracharya Institute of  
Medical Sciences, Bhilai - 490020,  
Chhattisgarh, India.

**E-mail:** abhiraj.tiwary@gmail.com

**ABSTRACT: Introduction:** Topical haemocoagulase (Botroclot) is a fractionated snake venom extract which acts as procoagulant and augments healing. In our study we ascertain the various causes of bleeding in routine clinical practice and evaluate the efficacy of this agent in arresting minor bleeding. **Aim and Objective:** To ascertain the various causes of bleeding in routine ear, nose, throat (E.N.T.) practice in a tertiary care center and evaluate the efficacy of topical haemocoagulase in arresting minor E.N.T. and head and neck bleed. **Materials and Methods:** This study was conducted from October 2019 to April 2024 in the Department of Otorhinolaryngology. A total of 582 patients presenting with nasal, aural, oral cavity, oropharyngeal, laryngeal and head and neck bleed were included in this study. The cause of bleeding pertaining to individual subsites were identified and charted in tabulated format. Haemocoagulase solution was used for topical instillation over the bleeding site. Time taken from the application of solution to the cessation of bleeding was noted. **Results:** Amongst all the cases, Nasal bleed was the most common presentation (205 patients). Trauma was the most commonly encountered cause in almost all the subsite bleed. 291 (50%) cases showed spontaneous cessation of bleeding on application of topical haemocoagulase. In 262 (45%) cases bleeding stopped in less than 1 min and in 29 cases (5%) it took more than 1 minute to stop. **Conclusion** Application of topical haemocoagulase fastens haemostasis, improves wound healing with no issues of rebound bleeding or any adverse effects even after multiple applications.

**INTRODUCTION:** A number of clinical situations are faced in Ear, Nose, Throat (E.N.T.) O.P.D. and casualty where patients present with epistaxis, aural bleed, facial injuries *etc* in which immediate and effective management is required.

During endoscopic and microscopic surgeries, bleeding can be annoying as it hinders visualisation, prolongs operating time, causes complications, necessitates requirement of transfusions.

Uncontrolled bleeding results in haemodilution, hypothermia and consumption of clotting factors and reduced supply of nutrients and oxygen in the area, leading to crusting and thereby impaired wound healing <sup>1</sup>. Rapid and deliberate action is needed to gain control of unanticipated bleeding and vigilance is required to prevent postoperative

<p><b>QUICK RESPONSE CODE</b></p> 	<p><b>DOI:</b> 10.13040/IJPSR.0975-8232.15(12).3638-42</p> <hr/> <p>This article can be accessed online on <a href="http://www.ijpsr.com">www.ijpsr.com</a></p> <hr/> <p>DOI link: <a href="https://doi.org/10.13040/IJPSR.0975-8232.15(12).3638-42">https://doi.org/10.13040/IJPSR.0975-8232.15(12).3638-42</a></p>
---	--

haemorrhage. Botroclot is a topical solution of sterile haemocoagulase 0.2 CU aqueous solution isolated from *Bothrops atrox*, along with chlorhexidine gluconate ip 0.1% v/v. Haemocoagulase acts as procoagulant, and chlorhexidine gluconate is a surfactant which prevents its systemic absorption<sup>2-3</sup>.

Once applied over bleeding site, it promotes fibroblast migration to the wound shortening the inflammatory phase of wound healing. Enzymes present in the drug convert fibrinogen into fibrin resulting in fibrin clot formation<sup>4-5</sup>. It facilitates thrombin formation at the site of haemorrhage by activating factor Xa. By acting factor XIIIa it also helps to stabilize fibrin, thereby facilitating arrest of capillary bleeding and tissue oozing from cuts or surgical wounds<sup>6</sup>.

It has a rapid onset of action, long lasting effect and low toxicity<sup>7</sup>. Few studies have also suggested that it also acts as a prohealer by enhancing epithelization, increasing wound tensile strength and turnover of collagen, thereby facilitating in the healing of wound<sup>8-9</sup>.

There is very little data on the efficacy of topical hemocoagulase application in the management of ear, nose, throat and head and neck bleeding. Hence, this study was undertaken to ascertain the various causes of bleeding in routine E.N.T. practice and evaluate the efficacy of topical haemocoagulase in arresting minor ear, nose, throat and head and neck bleeding.

**Aim and Objectives:** To ascertain the various causes of bleeding in routine E.N.T. practice and evaluate the efficacy of topical haemocoagulase in arresting minor ear, nose, throat and head and neck bleed.

**MATERIALS AND METHODS:** This study was conducted in the Department of Otorhinolaryngology, Shri Shankaracharya Institute of Medical Sciences, Bhilai, Chhattisgarh for a period of 5 years from October 2019 to April 2024. A total of 582 patients presenting to E.N.T. O.P.D. and casualty with minor nasal, aural, oral cavity, oropharyngeal and head and neck bleeding either due to trauma, inflammation, associated comorbidities or medication along with intraoperative bleeding in cases of E.N.T. and head

and neck surgeries were included in this study. The cause for bleeding pertaining to individual subsites were identified and charted in tabulated format. Detailed history was taken regarding age, sex, date of event, associated comorbidities and medication and personal history. Haemocoagulase solution 0.2CU was used for topical instillation either directly or soaked in gauze over the bleeding site. Time taken from the application of solution to the cessation of bleeding was noted and any adverse reaction or anaphylaxis episode documented.

**RESULTS:** Of the total 582 patients, 319 patients (55%) belonging to 21-40 year age group was the most commonly treated (55%) followed by 145 patients (25%) belonging to the 20 years age group. 30 patients (<5%) were aged more than 60 years

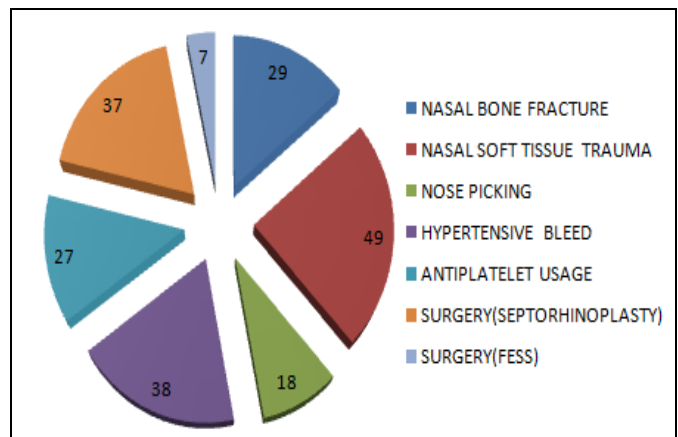
**Table 1.**

**TABLE 1: SHOWING AGE DISTRIBUTION OF PATIENTS IN THE STUDY**

Age group (in years)	Patients	Percentage %
<20	145	25 %
21-40	319	55 %
41-60	88	15 %
>60	30	5 %
Total	582	

466 patients (80.1%) were males while 116 patients (19.9%) were females.

Amongst all the cases, nasal bleeding was the most common presentation (205 patients). Most common cause for nasal bleed was soft tissue trauma (24%) followed by Hypertension (18.5%) and septorhinoplasty (18%). Other causes included traumatic nasal bone fracture, nose picking, medications such as antiplatelet use, and Functional Endoscopic Sinus Surgery (FESS) **Table 2 Fig. 1.**



**FIG. 1: NASAL BLEED**

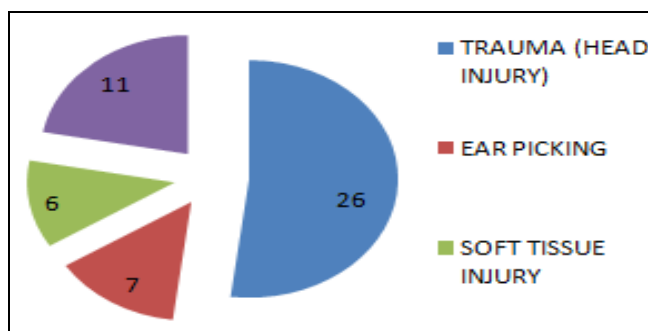
**TABLE 2: CLINICAL PROFILE OF PATIENTS PRESENTED WITH NASAL BLEED**

Cause	Patients	Percentage %
Nasal Bone Fracture	29	14.1%
Nasal Soft Tissue Trauma	49	24%
Nose Picking	18	8.78%
Hypertensive Bleed	38	18.5%
Antiplatelets Usage	27	13.2%
Surgery (Septorhinoplasty)	37	18%
Surgery (Fess)	7	3.4%
	205	

50 Patients (8.6%) presented with ear bleed. Most common cause of ear bleed in the study was head injury (52%) followed by granulations in external auditory canal, ear picking and soft tissue injuries of the ear **Table 3 Fig. 2**.

**TABLE 3: CLINICAL PROFILE OF PATIENTS PRESENTING WITH EAR BLEED**

Cause	Patients	Percentage %
Trauma (Head Injury)	26	52 %
Ear picking	7	14 %
Soft tissue injury	6	12 %
Granulations in the external auditory canal	11	22 %
	50	

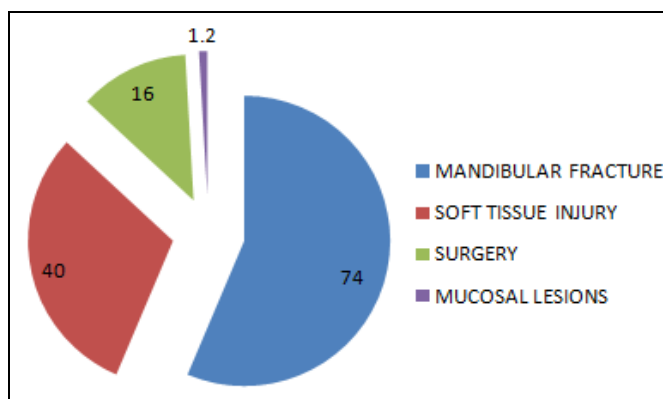


**FIG. 2: EAR BLEED**

Oral cavity bleeding was seen in 138 patients (23.7%). Most common cause was mandibular fracture accounting for 53.6% cases followed by soft tissue injuries of the oral cavity (28.9%), surgery and mucosal lesions **Table 4 Fig. 3**.

**TABLE 4: CLINICAL PROFILE OF PATIENTS PRESENTING WITH ORAL CAVITY BLEED**

Cause	Patients	Percentage %
Mandibular fracture	74	53.6%
Soft tissue injuries	40	28.9%
Surgery	16	11.6%
Mucosal Lesions	8	5.7%
Total	138	

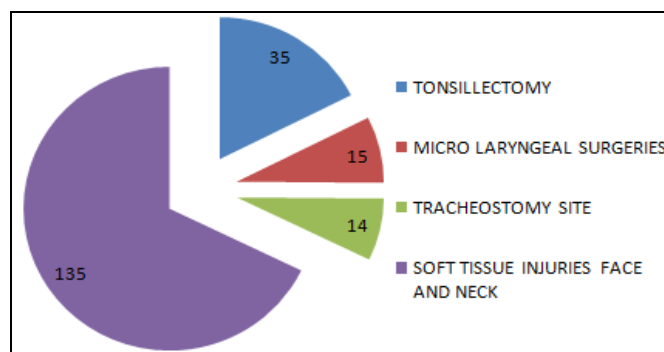


**FIG. 3: ORAL CAVITY BLEED**

Oropharyngeal, laryngeal and neck bleed was present in 199 cases (34.1%). Soft tissue injuries of face and neck accounted for 67.8% of cases followed by tonsillectomy (17.5%), microscopic laryngeal surgeries (7.5%) and tracheostomy site bleed (7%) **Table 5 Fig. 4**.

**TABLE 5: CLINICAL PROFILE OF PATIENTS PRESENTING WITH OROPHARYNGEAL, LARYNGEAL AND NECK BLEED**

Cause	Cases	%
Tonsillectomy	35	17.5%
Micro laryngeal surgeries	15	7.5%
Tracheostomy site	14	7%
Soft tissue injuries face and neck	135	67.8%
	199	



**FIG. 4: OROPHARYNGEAL, LARYNGEAL AND NECK BLEED**

Application of botroclet in various sites showed spontaneous cessation of oozing and minor bleeds

in 291 patients (50% of the cases). Bleeding stopped in less than 1 min in 262 patients (45% cases). In 29 cases (<5% cases) bleeding continued for more than 1 min even after application of the drug. This group mostly included vessel bleeds and excessive bleed due to multiple puncture points

### Table 6.

**TABLE 5: TIME TAKEN FOR HAEMOSTASIS AFTER APPLICATION OF BOTROCLOT**

Duration	Patients	Percentage %
Instantaneously	291	50 %
Less Than 1min	262	45 %
More Than 1 Min	29	5 %
	582	

**DISCUSSION:** In our study, among the E.N.T. and head and neck bleeding cases, nasal bleed was the most common presentation (205 patients). Most commonly it occurred due to soft tissue trauma (24%). Oropharyngeal, laryngeal and neck bleeding was present in 199 cases (34.1%) most commonly associated with soft tissue injuries of face and neck (67.8% of the cases). Oral cavity bleeding was seen in 138 patients (23.7%) most commonly resulting from mandibular fracture (53.6% cases). 50 Patients (8.6%) presented with ear bleed most commonly resulting due to head injury (52% of cases). Topical haemocoagulase (botroclot) is a drug launched few years back as a procoagulant. Haemocoagulase as Botropase and other agents like Premarin and Tranexamic acid have been already in use parentally and if required locally also. But the drug we have studied has been found to be very effective locally. As seen in the study done by V. Shenoy K. while doing dental extraction, the use of botroclot, a topical preparation available in the market improves and accelerates healing<sup>10</sup>.

In our study, we applied topical haemocoagulase in minor ear, nose, oral cavity, oropharyngeal, laryngeal and head and neck bleed and obtained spontaneous cessation of bleeding in 291 patients (50% cases). Bleeding stopped in less than 1 min in 262 patients (45% cases). In 29 cases (<5% cases) bleeding continued for more than 1 min even after application of the drug. This group mostly included vessel bleeds and excessive bleed due to multiple puncture points. Swamy, Baretto and Rodrigues in their study on the use of haemocoagulase as a haemostatic agent in children undergoing extraction of primary teeth, obtained complete

cessation of bleeding in the haemocoagulase group  $82.5 \pm 13.99$  s and  $240.5 \pm 54.34$  s in the normal saline group<sup>11</sup>. Mazumdar *et al* in their study applied haemocoagulase topically on extracted tooth socket and compared with extracted socket without haemocoagulase. The average time for stoppage of bleeding at the test side was 1.35 minutes compared to 2.25 minutes at the control side<sup>12</sup>.

Ebenezer and Ramalingam in their study showed topical hemocoagulase to be an effective hemostatic agent after tooth extractions which also reduced pain, swelling and improved wound healing<sup>13</sup>. Torigoe *et al* in their study concluded that haemocoagulase could be an option for reducing post renal biopsy bleeding<sup>14</sup>. Rahmatkar *et al* in their experience with bleeding post dental extraction achieved significant reduction of bleeding time with the use of topical haemocoagulase<sup>15</sup>. Mukherjee *et al* in their study concluded that both hemocoagulase and feracrylum can lessen the post extraction bleeding time, amount of blood lost and after orthodontic extraction when compared to the regular dressing of a sterile gauze<sup>16</sup>.

Quick arrest of bleeding was specifically helpful during endoscopic and microscopic surgeries as it resulted in better visualization, reduced operation time, less stress during surgery and decreased risk of post-operative bleeding. In traumatic cases too, it proved to be quite helpful by reducing the overall time for surgical repair and promoting faster healing of tissues.

**CONCLUSION:** Topical haemocoagulase (botroclot) is a novel agent which aids in the cessation of bleeding and fastens wound healing process. Desired action is achieved in much less time with no side effects like rebound bleeding or systemic absorption and it is also compatible with multiple instillations. It is cheap and easily available facilitating its widespread usage.

**Contribution of Authors:** Dr. Meenakshi Kekre: Manuscript Preparation, Manuscript review, Final Approval. Dr. Abhiraj Tiwari: Data acquisition, Definition of intellectual content, Manuscript editing. Dr. Smriti Saxena: Definition of intellectual content, Literature search. Dr. Mohan Krishna: Concept, Data acquisition, Manuscript



preparation. Dr. Piyush Sinha: Data Acquisition, Manuscript preparation. Dr. Suman Chandrakar: Manuscript preparation.

**Consent:** Informed and written consent was taken from the patients before being enrolled in the study and before the submission of article.

**Ethical Clearance:** This study was done in accordance with the ethical standards of the institutional and/or national research committee or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

**Funding Source:** None

**ACKNOWLEDGEMENT:** Nil

**CONFLICT OF INTEREST:** The authors declare “No conflict of interests”.

## REFERENCES:

- Marietta M, Facchini L, Pedrazzi P, Busani S and Torelli G: Pathophysiology of bleeding in surgery. *Transplant Proc* 2006; 38(3): 812-4. <https://doi.org/10.1016/j.transproceed.2006.01.047>. PMID: 16647479.
- Ohkura N: Potential applications of Chinese herbal medicines with hemostatic properties. *Drug Discoveries & Therapeutics* 2022; 16(3): 112-7.
- Stocker K and Barlow GH: The coagulant enzyme from *Bothrops atrox* venom (Batroxobin). *Methods Enzymol* 1976; 45: 214-23.
- Albert D, Muthusekhar MR, Sivashanmugam S and Sridharan G: Role of topical hemocoagulase in postoperative wound healing following dentoalveolar extraction: A systematic review. *International Journal of Health Sciences* 2022; 6(4): 5521-32. <https://doi.org/10.53730/ijhs.v6nS4.9340>.
- Lee: Risk factors and clinical outcomes associated with acquired hypofibrinogenemia in patients administered hemocoagulase batroxobin for hemoptysis. *J Thorac Dis* 2023; 15(1): 65-76.
- Vijayakumar G, Sundaram GA, Kumar SP, Lakshmanan S, Krishnan M and Krishna VK: Comparison of efficacy of topical carica papaya leaf extract and hemocoagulase in postoperative wound healing after therapeutic orthodontic premolar extractions. *A Split Mouth Study* 2024; 16(6): e61946. <https://doi.org/10.7759/cureus.61946>. PMID: 38978880.
- Wang L, Wang C, Zhang D, Wang W and Wang F: Effectiveness and safeties of hemocoagulase and tranexamic acid to reduce perioperative blood loss in intertrochanteric fracture PFNA fixation. *Acta Orthopaedica Belgica* 2023; 89: 645-50. <https://doi.org/10.52628/89.4.11959>. PMID 38205755.
- Keni R: Botrops derived hemocoagulase formulation a probable agent for diabetic wound healing. *Biotech* 2020; 10: 443. <https://doi.org/10.1007/s13205-020-02429-5>. PMID 33014686.
- Ramesh KV, Rao CM, Bairy KL, Ramanarayan K and Kulkarni DR: Effects of procoagulants on wound healing. *Indian J Exp Biol* 1990; 28(1): 43-5.
- Shenoy KV, Baliga M, Mahajan S and KVR: The effects of topical hemocoagulase solution on the healing process of post-extraction wounds. *A Split Mouth Design J Maxillofac Oral Surg* 2015; 14(3): 586-93. <https://doi.org/10.1007%2Fs12663-014-0700-2>.
- Swamy DF, Barretto ES and Rodrigues JSL: Effectiveness of topical haemocoagulase as a haemostatic agent in children undergoing extraction of primary teeth: a split-mouth, randomised, double-blind, clinical trial. *Eur Arch Paediatr Dent* 2019; 20(4): 311-7. <https://doi.org/10.1007/s40368-018-0406-0>. PMID: 30900152.
- Majumder K, Shalender, Dayashankara Rao JK, Gehlot N, Arya V and Siwach V: Efficacy of haemocoagulase as a topical haemostatic agent after minor oral surgical procedures a prospective study. *International Journal of Clinical Medicine* 2014; 5(14): 875-83. <http://dx.doi.org/10.4236/ijcm.2014.514117>.
- Ebenezer V and Ramalingam B: Efficacy of hemocoagulase as a topical hemostatic agent after extractions: a review. *European Journal of Molecular & Clinical Medicine* 2020; 7(3): 1933-36.
- Torigoe K, Yamashita A, Abe S, Muta K, Mukae H and Nishino T: Effect of hemocoagulase on the prevention of bleeding after percutaneous renal biopsy. *Toxins* 2022; 14: 223. <https://doi.org/10.3390/toxins14030223>. PMID 35324720.
- Rahmatker AK, Jain N, Sharma P, Pillai AK, Handa H and Joshi R: Evaluation of different hemostatic method in achieving hemostasis in patient on oral anticoagulant therapy. *SVOA Dentistry* 2024; 5(1): 26-32. <https://doi.org/10.58624/SVOADE.2024.05.0166>.
- Mukherjee M, Chitlangia P, Sharma AK, Adurti A, Doodi RK and Talreja PR: Comparative evaluation of bleeding and pain after orthodontic extraction with hemocoagulase v/s 1% feracrylum solution – a prospective split mouth study. *National Research Denticon* 2023; 12(2): 8-14.

### How to cite this article:

Kekre M, Tiwari A, Saxena S, Krishna AM, Sinha P and Chandrakar S: Our experience of using topical haemocoagulase (botroclot) in arresting ear, nose, throat and head and neck bleed in a tertiary care center. *Int J Pharm Sci & Res* 2024; 15(12): 3638-42. doi: 10.13040/IJPSR.0975-8232.15(1).3638-42.

All © 2024 are reserved by International Journal of Pharmaceutical Sciences and Research. This Journal licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.

This article can be downloaded to **Android OS** based mobile. Scan QR Code using Code/Bar Scanner from your mobile. (Scanners are available on Google Playstore)