

Spontaneous Tonsillar Hemorrhage: Advances in Acute Management, Diagnostic Strategies and Long-Term Care – Insights from Recent Case Studies and a Comprehensive Literature Review

Fiona Anna Molnar¹, Andras Nagy², Andras Kiraly², Zsigmond Tamas Kincses², Laszlo Rovo¹, Adam Perenyi^{1,2}

1. Department of Otorhinolaryngology, Head and Neck Surgery, University of Szeged, Hungary.

2. Department of Radiology, Head and Neck Surgery, University of Szeged, Hungary.

Article Info

Article Note:

Received: December 2024

Accepted: December 2024

Publish Online: December 2024

Corresponding Authors:

Dr. Fiona Anna Molnar

Email:

drmolfariona@gmail.com

Keywords:

Spontaneous Tonsillar Hemorrhage;
Tonsillectomy;
Digital subtraction angiography;
Endovascular intervention.

Abstract

Background: Spontaneous tonsillar hemorrhage (STH) is a rare complication of acute or chronic tonsillitis, with 63 cases reported in the literature. Despite these, no consensus exists on therapeutic pathways for STH.

Case presentation: Case 1: A 26-year-old presented with hemoptysis and a 2x3mm coagulum on the right tonsil. After admission and administration of dicynone, a significant bleed of 350ml occurred. Bleeding was controlled under general anesthesia using bipolar diathermy. CT angiography and MRI revealed a blood-filled cavity caused by erosion of the descending palatine artery. Digital subtraction angiography (DSA) confirmed this and was followed by super-selective embolization.

Case 2: A 46-year-old presented with hemoptysis and a 5x5mm coagulum on the right tonsil. The bleed was managed with bipolar diathermy. CT angiography showed a right tonsillar abscess without arterial malformations. Case 1 represents the first reported use of DSA and embolization to manage STH caused by an aberrant artery.

Conclusion: These cases and a literature review informed a diagnostic and therapeutic protocol for STH. Vascular malformations must be excluded before emergency tonsillectomy, with DSA playing a key role in identifying and managing arterial involvement.

Conflicts of Interest: The Authors declare no conflicts of interest.

Please cite this article as: Molnar FA, Nagy A, Kiraly A, Kincses ZT, Rovo L, Perenyi A. Spontaneous Tonsillar Hemorrhage: Advances in Acute Management, Diagnostic strategies and Long-Term Care – Insights from Recent Case Studies and a Comprehensive Literature Review. J Otorhinolaryngol Facial Plast Surg 2024;10(1):1-9. <https://doi.org/10.22037/orlfps.v10i1.47678>

Introduction

Spontaneous tonsillar hemorrhage (STH) is a rare, potentially life-threatening condition often seen in younger patients. It is defined as continuous bleeding for over one hour or a blood loss exceeding 250 ml (1). STH was common before the advent of antibiotics, primarily associated with tonsillitis and peritonsillar abscesses (2). Without timely intervention, infection can erode vessels, including the carotid artery, resulting in catastrophic outcomes (3). STH can also arise from coagulopathies or malignancies. This condition often requires prompt management to prevent airway obstruction (4). While most literature supports tonsillectomy during active

bleeding, performing this without adequate preoperative evaluation can be dangerous (3). We present two recent cases and a literature review to gain a clearer understanding and develop a diagnostic and treatment protocol. A chart review of two STH cases was conducted, documenting demographic, clinical, and imaging findings. Additionally, a comprehensive literature review was performed using PubMed, with search terms “spontaneous tonsillar hemorrhage” and “spontaneous tonsillar haemorrhage,” yielding 63 relevant cases. Studies lacking full-text availability or those in non-English languages were excluded.

Case 1

A 26-year-old Korean male presented with hemoptysis and no prior history of tonsillectomy, trauma, or coagulopathy. Initial examination revealed a small coagulum (2x3 mm) on the right tonsil. Both palatine tonsils were Friedmann grade II, and no sign of inflammation or asymmetry was observed. Despite observation and administration of intravenous etamsylate, a significant arterial bleed (350 mL) occurred two

hours later, necessitating immediate intervention. The bleed was manually compressed with an adrenaline-soaked sterile gauze. Under general anesthetic, the bleeding was controlled using a bipolar diathermy. Intraoperatively, an erosive crypt was seen from the bleeding site. No asymmetry of the palatine tonsils, the pillars, or the soft palate was seen. The peritonsillar tissues did not feel firm or pulsating on palpation.

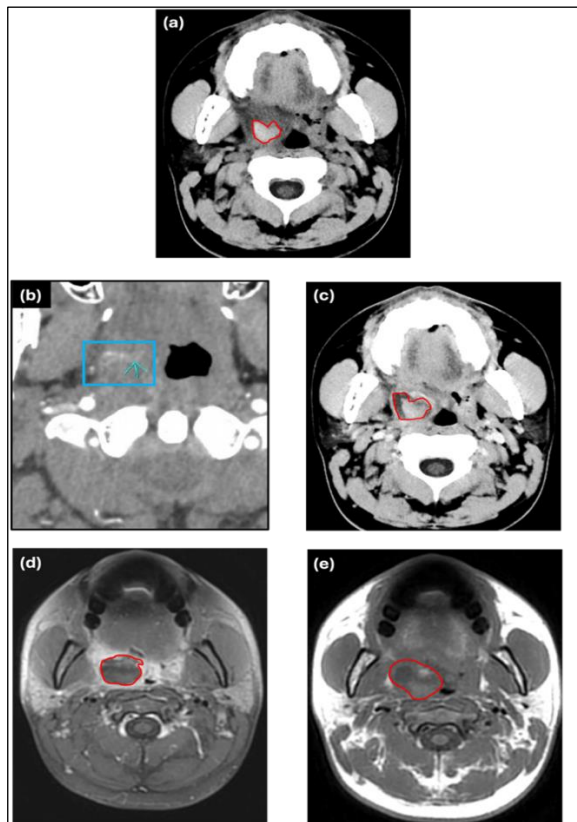


Figure 1. CT imaging of the 26-year-old patient, 5-6 hours post bipolar diathermy of the spontaneous tonsillar hemorrhage. (a) Non-contrast CT shows a well-defined inhomogeneous hyperdense region in the peritonsillar area. (b) CT angiography of the right pharyngeal region, blue rectangle indicating the right tonsillar/peritonsillar space, a 10x25 mm axial spread of contrast from the aberrant artery highlighted with a blue arrow within a blue rectangle, (c) Late post-contrast CT imaging showing the enhancing wall surrounding the lesion (red highlighted area) (d) T1W MRI and (e) contrast-enhanced T1W MRI showing inhomogeneous material in the right tonsil and peritonsillar area (highlighted by the red shape) suggesting hemorrhage and a subacute peritonsillar abscess alongside an erosion of the artery (pseudoaneurysm).

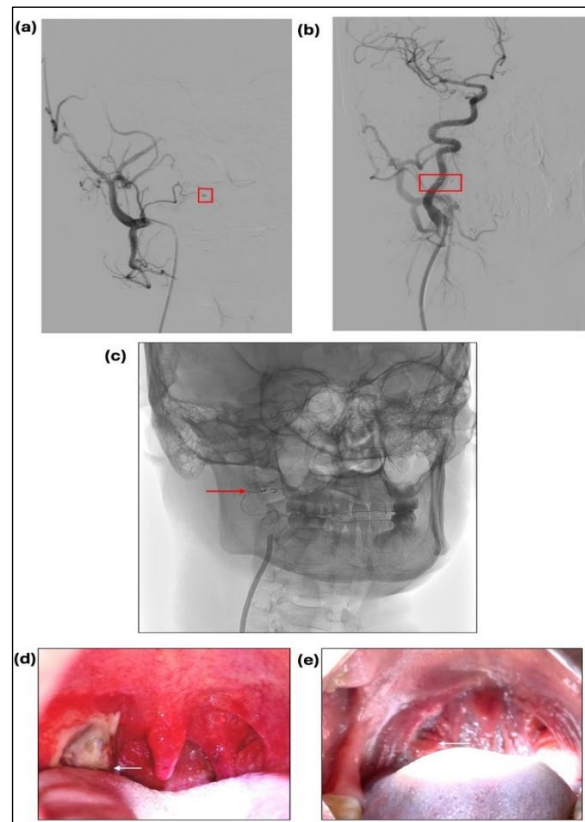


Figure 2. Digital Subtraction Angiography (DSA) treatment (panels a, b, and c) and postembolization imaging of spontaneous tonsillar hemorrhage (STH; panels d and e). (a) DSA of the right external carotid artery branches shows the branch of the descending palatine artery's pseudoaneurysm and reveals the contrast exit (highlighted by the red box). (b) DSA and super selective embolization of the arterial branch that fed the pseudoaneurysm using a 2 mm micro coil (the red rectangle highlights the coil) (c) DSA view of the 2 mm micro-coil in situ (highlighted by red arrow) (d) 1-day postoperative image of the right tonsil, the white arrow is pointing to the fibrinous exudate, slight asymmetry, and hyperemia are shown. (e) 2-week postoperative image of the oropharynx showing healed tonsillar tissue (white arrow) and significantly reduced swelling.

Laboratory tests indicated mild leukocytosis and a hemoglobin drop from 142 g/L to 120 g/L. Postoperatively, significant asymmetry due to bulging peritonsillar tissue was observed. Neck CT revealed a hyperdense lesion in the right parapharyngeal space with some contrast extravasation, indicative of an arterial bleed (Fig. 1a-c). MRI confirmed a pseudoaneurysm of the descending palatine artery eroding into the tonsillar tissue (Figure 1d-e). Digital subtraction angiography (DSA, Figure 2a) and subsequent super-selective embolization using a 2-mm microcoil (Cook Medical, Nester 18-3-2) successfully managed the pseudoaneurysm (Figure 2 b-c). Post-treatment, the patient received antibiotics and showed no recurrence of bleeding at a two-week follow-up. Virology testing revealed prior Epstein-Barr Virus (EBV) and Cytomegalovirus exposure, without active infection. On examination, no swelling, asymmetry, or fibrinity was seen (Figure 2d).

Case 2

A 46-year-old Caucasian male was referred due to hemoptysis episodes during sleep. Examination showed a 5x5 mm coagulum on the right tonsil, Friedmann grade II, without inflammation or asymmetry. The initial bleed was controlled with

bipolar diathermy. While leukocyte, hemoglobin and PT/PTT levels were normal, CRP was slightly elevated (11.5). CT angiography revealed a subacute tonsillar abscess and a tonsillolith (Figure 3) without vascular malformations. The patient was treated with antibiotics and observed for 48 hours, after which he was discharged without further incidents.

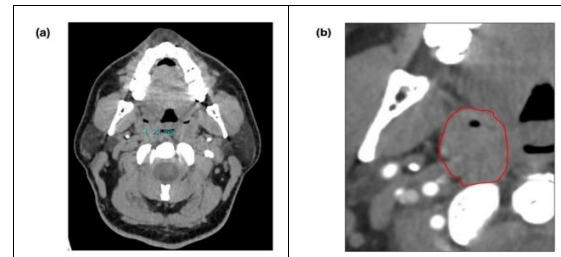


Figure 3. CT imaging of the 46-year-old patient, 20 hours after the spontaneous tonsillar hemorrhage (a) CT angiography of the right pharyngeal region, the blue line indicates a 2.1 mm tonsillolith. (b) CT angiography showed a tonsillar abscess formation, and no arterial malformation was observed.

Review of the published STH cases

Our review identified 63 reported cases of STH over 50 years old (Table 1). The average patient age was 15.93, with a higher prevalence in young adolescents (7). Infectious mononucleosis and idiopathic causes were common etiologies (8).

Table 1. Summary of data from the literature regarding patients with spontaneous tonsillar hemorrhage (STH)

Author	Age and sex	Symptoms	Imaging modality used in diagnosis	Treatment approach for the spontaneous tonsillar bleed	Outcome of treatment intervention
Kelly and Sanders (1974)	Adult, age not specified	Infectious mononucleosis	No information provided	Tonsillectomy	No information provided
McCormick and Hassett et al. (1987)	2-year-old, sex not specified	Acute tonsillitis	No information provided	Tonsillectomy (ties and diathermy) 3 rd postoperative day: bleed	No information provided
John et al. (1988)	F: 7	Measles	No information provided	Tonsillectomy	The patient developed measles 2 days after the tonsillectomy, the histology confirmed the measles after surgery

Griffies et al. (1988)	M:30 M: 19 M: 28 M:21 F:9 M:20 M: 26 M:21 M:32 M:51	80% bacterial acute tonsillitis; 1 infectious mononucleosis; 1 neoplasm	30 M: CT angiography which was negative 19 M: CT angiography which was negative 28 M: CT angiography which was negative 21M: Nativ CT which was negative.	30 M: stopped spontaneously, IV penicillin 19 M: Ligated, tonsillectomy 3-6 weeks after infection 28 M: Neo-Synephrine spray, IV penicillin, tonsillectomy 21 M: IV penicillin, stopped spontaneously 9 F: Bovie coagulation, IV penicillin 20 M: Silver nitrate cautery 26 M: Injected with Xylocaine with epinephrine, IV pencilling G 21 M: Stopped spontanously, IV pencillin. 32 M: Stopped spontaneously, IV penicillin 51 M: Silver nitrate, referred for radiation therapy, biopsy	51 M: histology confirmed tonsillar neoplasm and radiation therapy was recommended.
Levy et al. (1989)	M: 6 F: 16 M: 6 F: 6 F: 9 F:4 M:7 F: 25 F:16 M:4 M:3	5M IX deficiency, remainder suggest acute tonsillitis with group A beta hemolytic streptococci dominance	No information provided	5 stopped spontaneously; 5 AgNO ₃ , 1 electrocautery under GA; 2 required blood transfusion	No information provided
Murty et al. (1991)	M: 20	Hypertension 240/140 mm Hg	No information provided	Sodium nitroprusside	The patient began to take atenolol and slow release nifedipine and had no further haemorrhage complaints
Vaughan and Parker (1993)	F: 20	Idiopathic	No information provided	Hydrogen peroxide gargle. Hours later a recurrent bleed: right side tonsillectomy	No information provided
Shatz (1993)	M: 4 M: 3 M: 4.5	4 M and 4.5 M: Acute tonsillitis	No information provided.	4 M: IM penicillin G, spontaneously resolved.	Complaints resolved

		3 M: streptococcal 1 haemophilus		3 M: silver nitrate cautery, oral ampicillin 4.5 M: xylocaine spray and cauterization at the site of bleed	
Jawad and Balyney (1994)	M: 1.5 M: 6 M: 17 M: 10	Acute tonsillitis, 6M beta haemolytic streptococcus	No information provided.	IV antibiotics, 2 cases local AgNO3 (6M and 17M) ; 6M needed blood transfusion, all had elective tonsillectomy	Complaints resolved.
Koay and Norval (1995)	M: 19	Infectious mononucleosis	No information provided	Tonsillectomy	Complaints resolved.
Dawlatly et al. (1998)	2 female children, age not specified 2 female adults, age not specified	Acute tonsillitis	No information provided	Antibiotics and tonsillectomy	
Kumra et al., (2001)	M: 13 F: 11 F: 5	M: recurrent acute tonsillitis 11 F: acute tonsillitis 5 F: Von Willabrand disease Type II	No information provided	13 M: oral antibiotics, tonsillectomy performed the next day. 11 F: local pressure, silver nitrate cautery, 1 week course of antibiotics 5 F: packed red blood cells, fresh frozen plasma. Adenotonsillectomy was performed. Von Willebrand disease type II.	Complaints resolved
Seuno et al. (2003)	11 patients (age range 4- 63)	8 Acute tonsillitis, 2 with thrombocytopenic purpura, 1 with diffuse parenchymal bleeding of unknown aetiology		Antibiotics; one case of local application of oxidised cellulose	
Suh et al., (2007)	Adult, age not specified		MRI angiography performed which was negative	Tonsillectomy	Histology confirmed tonsillar carcinoma in the left tonsil (the locus of the bleed)

Jurkiewicz-Lobodzinska et al. (2007)	Adult, age not specified	Squamous cell carcinoma		Tonsillectomy	
Rocha et al. (2007)	F: 13	Acute tonsillitis		IV and oral antibiotics, cold food diet	
Byard (2008)	F: 12	Pharyngocarotid fistula caused by retropharyngeal abscess due to acute tonsillitis	No information provided	No information provided	Exsanguination
Siedek et al., 2008	F: 34	Tonsilla partim pendulans	No information provided	Tumor stem was coagulated and rescted under local anaesthesia.	No information provided.
Kim et al., (2010)	M: 42	Sore throat, treated intermittently with antibiotics.	No information provided	Silver nitrate cauterization 7 days later he presented again: emergency tonsillectomy was performed Post operative day 4 bleed from from the mouth and bipolar diathermy	
Vlastarakos and Iacovou 2013	M: 21	Acute tonsillitis	No information provided	Adrenaline soaked pledgets, compression and Emergency tonsillectomy	
Köycü et al., 2015	F: 36	Idiopathic	Carotid angiography was formed. No arteriovenous malformation of the tonsillar vessels was confirmed.	Tonsillectomy was performed.	
Sandman and Mitchell (2019)	M: 22	Acute mononucleosis	Nativ CT soft tissue neck revealed enlarged tonsils bilaterally with no peritonsillar abscess, retropharyngeal abscess or deep vessel erosion.	Acute management: saline bolus, ondasetron, ice water to gargle. Oxymetazoline spray. IV clindamycin and dexamethasone. tonsillectomy was performed	
Wahba and ElBeblawy et al, (2020)	F: 16		CT angiogram of the head and neck only	Emergent tonsillectomy	No information provided

(n=1)			showed enlarged nasopharyngeal lymphoid tissue.	
Tang et al., 2021	M: 19	History of chronic tonsillitis and coronavirus	No information provided	Benzocaine spray, silver nitrate, following day a tonsillectomy was performed

Discussion

STH is a life-threatening condition, and its pathogenesis may mirror hemorrhagic tonsillitis, where infection-induced inflammation causes vascular engorgement and necrosis, leading to vascular damage (5–7). A correlation exists between the two patients due to the rare clinical presentation of spontaneous tonsillar hemorrhage in both cases and while the precise etiology may differ, their similar presentation highlights the importance of comparing these cases to provide insights into the pathophysiology of this uncommon condition and guide future investigations. Furthermore, Case 1 represents the first documented use of DSA in STH management. Only three reported cases of STH linked to EBV were found, making EBV the third most common cause after acute tonsillitis and idiopathic causes (3, 8, 9). In contrast with our Case 1, a previous immunohistochemistry reported active EBV infection (9). However, EBV-associated STH typically manifests as superficial bleeds, unlike the deep hemorrhage seen in Case 1 (9).

Diagnostic difficulties

Imaging often provides limited insight into STH. The seven CT and one MRI angiographies were all negative for vascular abnormalities (1, 4, 11). Consistent with literature, the right superior pole was a common site for tonsillar bleeds (1, 4, 11). In Case 1, CT angiography confirmed an arterial bleed, while MRI revealed a well-defined peritonsillar cavity, indicative of a prior abscess. Recurrent bleeding supported the clinical suspicion of an arterial source. In idiopathic STH cases, CT angiography is sometimes employed to exclude arteriovenous malformations (10). For major vessel involvement, tonsillectomy may be

warranted (10).

Treatment approach: DSA vs tonsillectomy

Management strategies for STH range from local measures like benzocaine spray and silver nitrate to surgical interventions (1, 3–5). In Case 1, the severity of bleeding necessitated intraoperative bipolar diathermy to stabilize the airway. Continuous bleeding may require interventions such as adrenaline-soaked pledget compression or Hydrogen Peroxide (H₂O₂) gargles (3). Panendoscopy and/or tonsillectomy are recommended for superficial bleeds, but deep-seated hemorrhages may not be addressable via the pharynx. Emergent tonsillectomy has been performed in 22 reported STH cases, though postoperative complications or recurrent bleeding suggest underlying vascular anomalies in some cases (12, 13). Immediate tonsillectomy without imaging risks exacerbating arterial hemorrhages, such as carotid erosion. Based on Case 1, we recommend initial management with bipolar diathermy, observation, and CT angiography. If abnormalities are detected, DSA with super-selective embolization should be considered to prevent large vessel ligation.

Conclusion and recommendations

STH remains a challenging clinical condition requiring prompt diagnosis and intervention. In persistent or recurrent bleeds, imaging should be performed promptly.

Integrating preoperative imaging into the diagnostic algorithm can mitigate the risks of emergency tonsillectomy and improve patient outcomes, as shown in our cases, which emphasizes on the value of imaging—particularly DSA embolization—in managing pseudoaneurysms.

Recommendations

1. Stabilization: Compression with adrenaline-soaked pledgets and silver nitrate application.
2. Imaging: CT angiography to identify vascular abnormalities.
3. Definitive Management: For arterial bleeds, DSA and embolization are preferred over tonsillectomy. Conservative management suffices for abscess-related bleeds without vascular anomalies. Antibiotics tailored to suspected pathogens (e.g., amoxicillin-clavulanate for bacterial tonsillitis, cefuroxime for EBV).

Acknowledgments

The authors would like to thank the Albert Szent-Györgyi Clinical Centre, University of Szeged Department of Radiology Albert Szent-Györgyi Clinical Centre, University of Szeged Department of Vascular surgery and Albert Szent-Györgyi Clinical Centre, University of Szeged otolaryngology ward and operative team for their contribution to this case.

Conflicts of Interest

The authors declare no conflicts of interest.

Financial Support

The authors declare there is no funding support for this study.

Patients' Perspective: Written consent was obtained from the patient. The whole examination process and the article's purpose were thoroughly explained.

Authors ORCIDs

Fiona Anna Molnar

<https://orcid.org/0000-0002-4185-7292>

Andras Nagy

<https://orcid.org/0000-0002-1796-8814>

Andras Kiraly

<https://orcid.org/0000-0003-3729-3911>

Zsigmond Tamas Kincses

<https://orcid.org/0000-0002-1442-4475>

Laszlo Rovo

<https://orcid.org/0000-0003-1782-1756>

Adam Perenyi

<https://orcid.org/0000-0002-9162-6476>

Author Contributions

F.M. writing original draft, conceptualization, data curation, N.A. data curation, validation, writing – review and editing. K.A. data curation, validation, writing – review and editing. K.Z.T. data curation, validation, writing – review and editing. R.L. supervision, validation, writing – review and editing. P.A. supervision, writing - original draft, data curation.

References

1. Griffies WS, Wotowic P, Wildes TO. Spontaneous tonsillar hemorrhage. *Laryngoscope*. 1988;98(4):365–8.
2. Dawlatly EE, Satti MB, Bohliga LA. Spontaneous tonsillar hemorrhage: an underdiagnosed condition. *J Otolaryngol*. 1998;27(5):270–4.
3. Salem A, Healy S, Pau H. Management of spontaneous tonsillar bleeding: Review. *J Laryngol Otol*. 2010;124(5):470–3.
4. Sandman C, Mitchell C. Not just a sore throat: A case of spontaneous tonsillar hemorrhage in acute mononucleosis infection. *J Emerg Med*. 2019;57(3).
5. Kumra V, Gosh V, Sapra P, et al. Spontaneous tonsillar hemorrhage. *Otolaryngol Head Neck Surg*. 2001;124(1):51–2.
6. Kim YS, Kim SY, Lee CH, et al. Spontaneous tonsillar hemorrhage and post-tonsillectomy hemorrhage. *Clin Exp Otorhinolaryngol*. 2010;3(1):56.
7. Levy S, Brodsky L, Stanievich J. Hemorrhagic tonsillitis. *Laryngoscope*. 1989;99(1):15–8.
8. Johnsen T, Katholm M, Stangerup S-E. Otolaryngological complications in infectious mononucleosis. *J Laryngol Otol*. 1984;98(10):999–1001.
9. Wahba A, ElBeblawy R. Spontaneous tonsillar hemorrhage due to infectious mononucleosis. *Cureus*. 2020:e10367.
10. Köycü A. Idiopathic spontaneous tonsillar hemorrhage. *Turk J Ear Nose Throat*. 2015;25(2):122–5.
11. Suh KW, Djalilian M, Lake CF, Devine KD. Bleeding as an initial sign of carcinoma of the tonsil. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 1974;38:695–7.
12. Kelly PC, Sanders M. Tonsillar hemorrhage. Unusual complication of infectious mononucleosis. *N Y State J Med*. 1974;74:2021–2.
13. McCormick MS, Hassett P. Spontaneous haemorrhage from the tonsil (a case report). *J Laryngol Otol*. 1987;101:613–6.

14. John DG, Thomas PL, Semeraro D. Tonsillar haemorrhage and measles. *J Laryngol Otol.* 1988;102:64–6.
15. Zhao LB, Shi HB, Park S, et al. Acute Bleeding in the Head and Neck: Angiographic Findings and Endovascular Management. *AJNR Am J Neuroradiol.* 2014;35(2):360–6.
16. Koay CB, Norval MB. An unusual presentation of an unusual complication of infectious mononucleosis: haematemsis and melena. *J Laryngol Otol.* 1995;109:335–6.
17. Poddar S. Review of literature for stepwise management of post-tonsillectomy hemorrhage. *J Otolaryngol ENT Res.* 2016;5:00142.
18. Seuno K, Yamada Y, Yamaguchi T, et al. Spontaneous tonsillar hemorrhage [in Japanese]. *Practica Otol (Kyoto).* 2003;96:427–34.
19. Jurkiewicz-Lobodzinska M, Gerwel A, Siewruk-Kalicka A. Bleeding as an initial symptom of tonsillar carcinoma [in Polish]. *Otolaryngol Pol.* 2007;61:315–8.
20. Byard RW. Tonsillitis and sudden childhood death. *J Forensic Leg Med.* 2008;15:516–8.
21. Vlastarakos PV, Iacovou E. Spontaneous tonsillar hemorrhage managed with emergency tonsillectomy in a 21-year-old man: a case report. *J Med Case Rep.* 2013;7:192.
22. Rocha SCM, Dell’Aringa AR, Nardi JC, et al. Spontaneous tonsillar hemorrhage. *Braz J Otorhinolaryngol.* 2007;73(2):287.
23. Watson MG. Bleeding tonsils. *BMJ.* 1990;301(6763):1233–4.
24. Joseph S, Prakash M, Mohammed HK, Govar A. Benign Mass in Tonsil - Cavernous Hemangioma. *J Clin Diagn Res.* 2013;7(10):2284–5.
25. Murty GE, Samani NJ, Moloney JR. Bleeding tonsils. *BMJ.* 1991;302(6770):236.
26. Vaughan MM, Parker AJ. Idiopathic spontaneous tonsillar haemorrhage. *J Laryngol Otol.* 1993;107:44–5.
27. Shatz A. Spontaneous tonsillar bleeding secondary to acute tonsillitis in children. *Int J Pediatr Otorhinolaryngol.* 1993;26:181–4.
28. Jawad J, Blayney AW. Spontaneous tonsillar haemorrhage in acute tonsillitis. *J Laryngol Otol.* 1994;108:791–4.
29. Tang K, Wade HV, Wade CI. Spontaneous Tonsillar Hemorrhage in a Severe Acute Respiratory Syndrome Coronavirus 2 Positive Male. *J Radiol Nurs.* 2021;40(3):239–40.
30. Sessa M, Govoni M, Piazza P, et al. Iatrogenic bleeding of extracranial internal carotid artery aneurysm mimicking peritonsillar abscess. *Acta Biomed.* 2021;92(Suppl 1):e2021122.
31. Dawson JB. Haemorrhage from Peritonsillar Abscess – carotid tying in local anaesthetic. *Br Med J.* 1934;2(3840):284.
32. Klug TE, Greve T, Hentze M. Complications of peritonsillar abscess – bleeding pseudoaneurysm developed 35–45 days after the PTA drainage, internal carotid artery carotid sepsis. *Ann Clin Microbiol Antimicrob.* 2020;19:32.
33. Brzost J, Cyran AM, Waniewska M, Szczepanski MJ. Internal Carotid Artery Aneurysm Mimicking Peritonsillar Abscess. *Case Rep Otolaryngol.* 2015;2015:389298.
34. Siedek S, Reichel O, Harreus U. Spontaneous intratonsillar haemorrhage with acute dysphagia. *Eur Arch Otorhinolaryngol.* 2008;265:721–3.