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The Aetiology and Management of Epistaxis

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ABSTRACT

Epistaxis is the most common ENT emergency and one of the commonest presentation in an emergency department. Its management can be challenging depending on the origin of bleeding and presence of precipitating factors. This review discuss risk factors linked with epistaxis and critically analyse and evaluate the pathway of management based on the higher level of evidence available.

Introduction:

Epistaxis, also known as nasal bleeding, can be originating from the anterior or posterior nasal cavity blood supply. Nasal cavity has a very rich blood supply from branches of the internal and external carotid artery which also anastomose to form anterior and posterior plexuses. The majority of bleeds can be visualised anteriorly[1].

The first mention of epistaxis in medical literature dates back in the year 1867[2]. Bleeding originating from the anterior nasal cavity was managed with packing the nostril with pledgets. When the bleeding was originating from the posterior nasal cavity, a pledget secured in a wire was passed down the nostril to tamponade the posterior nasal space and arrest the bleed. In 1901, McKenzie started using adrenaline to arrest the bleed in more severe cases. Surgical treatment of epistaxis was first described in the mid-19th century for the arrest of severe posterior epistaxis[2-4]. The same management principles are used up to date for the management of epistaxis according to bleeding location, severity and treatment compliance[5].

The purpose of this review is to assess and critically analyse the aetiology of epistaxis in children and adults and discuss the different management options. The review will include the highest level of evidence available. Randomised control trials (RCT) and systematic reviews (SR) are meticulously designed to produce unbiased results without systematic errors. Hence, their outcomes can be used by clinicians to guide their clinical decisions[6]. When such studies are not available, studies of lower level of evidence will be included and possible design problems resulting in-presence of bias will be analysed.

Epidemiology

Epistaxis is the most common ENT emergency and one of the commonest presentation in an emergency department[6-9]. It is estimated that at least one episode of epistaxis occurs in more than half of the general population worldwide. The prevalence is bimodal. Two peaks are noted in children younger than 10 years of age and in adults over the age of 40[8-9]. Only a small proportion of these patients seek medical advice with the elderly being more likely to require hospital admission[10].

What is the cause?

There are many review papers listing potential causes of epistaxis in children and adults[11-13]. These risk factors are classically divided into local and systemic. Digital trauma-nose picking has been described as the main cause of nose bleeds in children. Epistaxis following nasal bone fractures has been advocated as the predominant local cause of bleeding in adults. Dry nasal mucosa[14] and epistaxis following an upper airway track infection have been also listed

as potential causes. Iatrogenic epistaxis following surgery on the nasal apparatus is also expected[15].

Recurrent episodes of the epistaxis have been attributed to the presence of local nasal or nasopharyngeal disease such as polyps and other benign or malignant lesions[16]. Presence of juvenile angiofibroma should be always excluded when a child is presented with recurrent severe epistaxis[17]. The use of nasal drops or sprays; oral blood thinning medications and steroids[18,19] and systemic diseases affecting blood clotting and vessels quality were also suggested as possible risk factors[20]. Most of these risks factors are supported by low level of evidence resources, predominantly retrospective studies and case series. This makes the validity of the outcome highly questionable as these studies suffer from high incidence of selection, performance and confounding bias[21].

A robust search of the literature revealed no RCTs looking at the effect of different factors on the incidence of epistaxis. This could be explained by the nature of the outcome of interest. A randomised trial assessing risks factors of epistaxis would require recruitment of a large number of subjects appropriately selected to have the same baseline characteristics. After randomisation subjects should be followed up for a prolonged period of time until an episode of epistaxis occurs. Subjects should be also carefully stratified hence controlling for gender, age, ethnicity, comorbidities and medications which can potentially have an additive effect and correlate with the presence of epistaxis. During a prolonged follow up period a considerable proportion of the subjects might develop additional co-morbidities or started on new medications or lost in follow-up hence diluting the effect of the primary factor being measured.

One SR was identified examining the presence of association between epistaxis and hypertension. Nine retrospective observational studies were selected for inclusion in the review with six of them concluding that there is a significant association[22]. Nevertheless, it was noted that four of them were retrospective studies with no control group and of small sample size. The remaining five studies did not have appropriately matched control groups without random allocation. Controlling for confounders was noted in only six studies. Meta-analysis was not performed due to presence of high heterogeneity across the studies. The SR appropriately stressed the fact that the studies were not helpful in answering the review question. The available literature consists of retrospective studies hence it suffers from significant recall and selection bias as the outcome of interest has already occurred by the time of beginning of study[23]. This creates problems in recruiting and enrolling appropriate control groups. Selection bias is less likely to occur in RCTs as the outcome of interest has not occur at the time of recruitment. Also, in studies without control groups, data for comparison are obtained from previous publications hence, introducing chronology bias by the use of historic controls[21].

Smith *et al.* conducted a prospective cohort study to assess the effect of anticoagulation and antiplatelet treatment in epistaxis. They recruited 290 patients who presented with epistaxis over a seven months period without setting exclusion criteria. Patients were divided into four distinct groups: warfarin; aspirin; clopidogrel and no medication. They found that patients on the warfarin and antiplatelet groups were significantly older, requiring longer hospital stay and were more likely to require surgical intervention even though this did not reach statistical significance. The main limitation in this study was that they did not consider confounding factors that might prolonged the hospital stay for this subgroup of patients[24]. They should have also considered performing a chi square test with a post hoc pairwise analysis to assess if presence of epistaxis across the four subgroups was statistically significant different[25] of note, their results were similar to an earlier prospective cohort study assessing the effect of aspirin in the presence of severe epistaxis. Patients on aspirin had a statistically significant higher likelihood to suffer severe and recurrent epistaxis[26].

Another interesting research paper from Mayo clinic studied the effect of more than 50 potential risk factors of epistaxis in the probability of patients experiencing a recurrence. This was a large sample size retrospective cohort study with appropriately matched controls who had only one episode of epistaxis. COX regression analysis performed and a hazard ratio was calculated for each of patients demographics, local and systematic risk factors.

Congestive heart failure, anaemia, diabetes, hypertension and warfarin were statistically significant predictor of epistaxis recurrence whereas other classical factors did not yield statistical significance[27]. This study has the limitation of recall bias due to retrospective data collection. Further prospective studies assessing these risk factors are needed to reduce the likelihood of systematic errors and validate the results of this study.

Treatment pathway

Every patient presented in an emergency setting with epistaxis should be fully assessed and appropriately resuscitated following the airway, breathing and circulation protocol[1]. Following stabilisation of patients' vital signs a definite plan for the arrest of bleed is formulated. Nasal preparation is of paramount importance. Cleaning the nasal cavity and applying local anaesthetic allows optimum visualisation of potential bleeding points. These can be cauterised by a silver nitrate stick which is the commonest cauterisation technique or by electrocautery which is most often used in a non-acute setting[11]. If this manoeuvre fails to control bleed, anterior packing of the nasal cavity with nasal tampons or ribbon gauze impregnated with vaseline or bismuth iodoform paraffin paste should be attempted. If the bleeding continues posterior packing should be considered. This is achieved by insertion of either a balloon or a gauze pad in the posterior nasal choana. Anterior or posterior packing should stay in situ for 24-48 hours and patient should be monitored in the hospital environment[28].

Success of epistaxis control is assessed after pack removal. Most of the epistaxis cases will be effectively managed with the techniques discussed above. Refractory cases will require a formal surgical intervention under general anaesthesia. Surgical options include: diathermy; septal surgery; sphenopalatine artery ligation and ligation of the anterior and/or posterior ethmoidal artery. In more severe cases ligation of the maxillary artery or external carotid artery can be attempted. Other management options which include: embolisation of bleeding vessels with very good results in refractory cases[29]; application of fibrin glue and electrocautery under general anaesthetic[30,31]. Lately, the use of laser and tranexamic acid injected locally has been shown to facilitate the control of epistaxis[32,33].

A small number of RCTs and SRs were found that compare the effectiveness of the above mentioned techniques. Yang *et al*. performed an SR to compare the effectiveness of the two main anterior nasal packing materials: Merocel and Rapid rhino. A total of four RCTs were included in their review. Even though the independent trials had small sample size after meta-synthesis no heterogeneity was identified. It was found that rapid rhino is easier tolerated by patients scoring lower in the discomfort and pain analogue scales. It was also easier in insertion and less likely to cause pain and reactionary bleeding on removal. No difference was found in the efficacy of bleeding control even though the 95% confidence interval was quite large and the trend suggested that rapid rhino packing had better results in bleeding control[34]. A RCT of larger sample size would be of benefit in answering this efficacy question by allowing a precise evaluation of the treatment effects with narrower confidence interval[23].

A recent SR compared the effect of different treatment options for the control of recurrent epistaxis in children[35]. It had well designed inclusion criteria trying to eliminate bias. They studies had at least 10 participants in each arm and those with missing data were excluded. They also kept the population homogeneous by including only children who had spontaneous recurrent epistaxis of unknown cause hence excluding children with juvenile angiofibroma which would require extensive surgery[17]. They concluded that use of antiseptic cream is effective in controlling bleeding when compared to the no treatment arm. This comes to a conflict with a previous SR which found no difference between the two groups[36]. Limitation of the second SR was the fact that there was no mention of intention to treat analysis in the trials included and they had less strict exclusion criteria hence including studies of very small sample size thus introducing reporting bias and increasing the likelihood of systematic errors.

McGarry also looked at differences between antiseptic cream applications versus silver nitrate cautery. He included one RCT in this subgroup analysis which reported no difference between the two treatments. Of note neither p values nor confidence intervals were quoted in this RCT thus making highly questionable the statistical analysis used to measure treatment effect. Finally, when he looked at the effect of antiseptic cream with cautery versus cream alone he found that patients on double treatment had less severe and infrequent recurrence[35]. One RCT was included in this analysis which had the largest number of patients found in trials of this research question. Hence their results are more likely to be a representative sample of the

population. It was also double blinded thus limiting the presence of performance bias[37]. Effectiveness of antiseptic cream in adults have not be assessed in RCTs.

A SR performed a decade ago stressed the fact that there are no prospective studies neither RCTs to compare the different surgical treatment of epistaxis. Results from retrospective studies suggest that patient have a better recovery following ligation of the sphenopalatine artery compared to maxillary artery ligation[38]. No further studies identified following that review and this reflects the fact that randomisation and prospective data collection is hard when different modalities of interventions are assessed in an emergency setting.

Conclusions:

Epistaxis is the most common ENT emergency. Many factors have been suggested to contribute in the incidence of epistaxis but the quality of studies needs to be improved, with more focus on level 1 evidence. Patients on anticoagulation treatment and those with systemic disease causing increase bleeding tendency have been shown to suffer from more severe and recurrent epistaxis.

Management of epistaxis follows a systematic approach starting from basic resuscitation followed by techniques to arrest the bleed. Rapid rhino anterior packing is well tolerated by adult patients. There is good evidence to suggest the beneficial role of antiseptic cream in the management of epistaxis in children. Similar studies lack in the adult population. There is a need of large preferably multicentre RCTs to compare different surgical and conservative treatments as well as the effectiveness of embolization techniques.

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