

Use of bipolar coagulation diathermy for the management of recurrent pediatric epistaxis

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Background

There is a lack of consensus as regards the optimal approach to the problem of recurrent pediatric epistaxis.

Objective

The aim of this study was to evaluate the use of bipolar coagulation diathermy in the management of recurrent pediatric epistaxis.

Patients and methods

This prospective study was conducted on 75 pediatric patients (6–15 years) with recurrent epistaxis, who were evaluated and treated with bipolar diathermic cautery during a 6-month follow-up period.

Results

During the follow-up period, 65 (87%) patients had complete absence of epistaxis with significant improvement ($P \leq 0.05$), nine (12%) patients had less than 10 attacks of epistaxis, and one patient had more than 10 attacks and was controlled with another trial of bipolar diathermic cautery. Patients with normal coagulation profile had significantly better results compared with patients with coagulation defects. Patients had no complications after the procedure.

Conclusion

Bipolar coagulation diathermy is an effective and safe procedure in the management of recurrent pediatric epistaxis.

Keywords:

bipolar diathermy, endoscopic nasal cautery, epistaxis management, pediatric epistaxis

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Introduction

Epistaxis (Greek for nose bleed) has been affecting humans since ancient times, often causing ill-founded anxiety in patients. Approximately 60% of the population is affected by epistaxis at some point in time, with 6% requiring professional medical attention [1]. The majority of epistaxis episodes in children is of local origin and rarely requires resuscitation. Although it may be intimidating to the attending physician, it can be managed effectively with a few acquired skills. Recurrent nose bleeds are an irritating, sometimes embarrassing, problem to both the child and the parent as they often occur unexpectedly [2].

Epistaxis is rarely seen in infants less than 2 years of age. Approximately 40% of children present with at least one episode of epistaxis by the age of 5 years. In the age group 6–10 years the incidence increases to 56% [3]. Although very little data are available, epistaxis seems to be more prevalent in the young male population. Epistaxis is commonly encountered during autumn and winter when a lower environmental humidity and frequently alternating temperatures prevail. The higher incidence of upper respiratory tract infections in children during winter months also contributes to nose bleeds [4].

Ninety percent of epistaxis in children originates from Little's area in the anterior part of the nose, often being either idiopathic or the result of trauma. Posterior epistaxis is uncommon in children and is usually the result of bleeding disorders, inflammatory disorders, or neoplasms [5]. Persistent or recurrent epistaxis should raise the suspicion of bleeding disorders or neoplasms, necessitating further investigation. There is no consensus as to the best approach for the evaluation of pediatric epistaxis [6,7]. In particular, no therapy has been proven to be safe, effective, and of use in both simple anterior epistaxis and posterior bleeds that have proven refractory to other methods [7].

There is no definitive protocol for the management of epistaxis, although various protocols have been proposed in the literature [8]. Most would agree that in a more controlled setting it is preferable to attempt to identify the site of bleeding and apply a focused treatment to that area [9,10]. Persistent bleeding necessitates

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operative interference [11,12]. Numerous operations have been described for refractory epistaxis in adults, including arterial ligation, endoscopic cauterization under general anesthesia, and angiographic embolization, with failure rates of 9–14% [13,14]. McGarry [15] has previously described the use of endoscopically guided electrocautery as a safe and effective treatment method for epistaxis in adults. The aim of this study was to address our experience in using the bipolar coagulation diathermy in the management of recurrent epistaxis among the pediatric patients.

Patients and methods

This prospective study comprised 75 pediatric patients between 6 and 15 years of age presented to the Otolaryngology Unit, Head and Neck Department at Minia University Hospital, with recurrent attacks of epistaxis between January 2012 and January 2014.

Inclusion criteria were as follows:

- (1) Failed conservative management of recurrent epistaxis in the form of application of emollient creams, cauterization with silver nitrates and/or repeated packing;
- (2) Patients with at least one attack of epistaxis monthly over the last 6 months before the enrolment in the study.

We excluded patients ($n = 60$ patients) who fulfilled any one of the following criteria:

- (1) Presence of marked nasal septal deviation obstructing the nasal cavity, or marked septal spurs;
- (2) Patients with nasal masses;
- (3) Patients with nasopharyngeal angiofibroma; and
- (4) Patients who were lost to follow-up after the procedure.

Demographic data including age, sex, and season of presentation were recorded. Other information included frequency, duration, the side affected, associated symptoms, history of nasal trauma, medical and surgical history, and medications used, with specific attention to NSAIDs and nasal corticosteroids. Personal and family history of coagulopathy were also ascertained.

The general approach for the evaluation of these patients involved a thorough physical examination with anterior rhinoscopy using headlight illumination with topical anesthetic and vasoconstrictive spray, flexible nasopharyngoscopy in all patients cooperative enough to tolerate, complete blood count, coagulation

profile including prothrombin time (PT) and activated partial thromboplastin time (aPTT) with reference to the international normalized ratio. Patients underwent computed tomography (CT) examination of the nose and paranasal sinuses to exclude any possible hidden cause of their recurrent epistaxis.

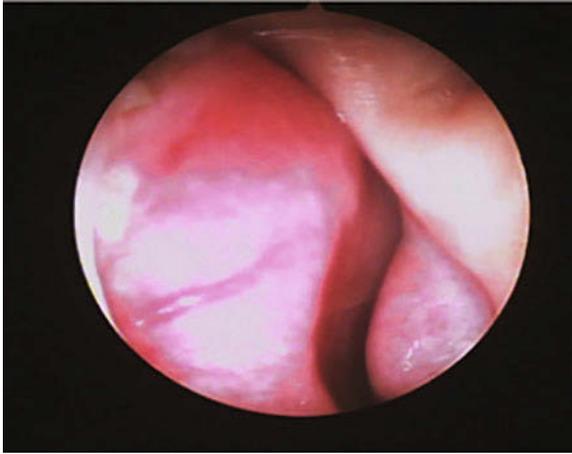
Fifty patients were cooperative enough to be treated on an outpatient basis under local anesthesia, and 25 patients required general anesthesia and were admitted in the inpatient care unit for few hours after the recovery. If the patient presented to us with active attack of bleeding, we usually attempted to stop the bleeding and perform bipolar diathermic cauterization at the same sitting. However, if the patient presented between the attacks we usually wait up to 1 week to complete the patient investigations.

If a bleeding point was accessible on the initial examination, it was treated under direct vision using the bipolar probe. If the bleeding point could not be visualized on anterior rhinoscopy, then a 2.7 or 4 mm 0 and 30° rod lens endoscopes were used to identify the bleeding point. We used the insulated suction bipolar diathermy probe (coagulator) (Fig. 1) to provide a clear view of field to allow identification of the bleeding point. The bleeding point was sought using a systematic approach, beginning with the anterior septal area, followed by the posterior septal area, and finally the posterior end of the middle turbinate. Once identified, the bleeding point was infiltrated using 0.5–1 ml of lignocaine 1% with 1 : 80 000 adrenaline (Figs 2–4). This was performed under endoscopic vision using a standard dental syringe and needle. The bleeding point was then cauterized using the insulated bipolar diathermy probe. Bipolar current was generated using a Wolf 1241 (Berlin, Germany) footplate-operated bipolar current generator with a maximum power setting of 49 W to produce current at a frequency of 249 kHz. In patients with bilateral epistaxis we cauterized both sides at the same sitting. After achievement of hemostasis, the nasal cavity was packed with a small gauze soaked with emollient and bactericidal creams, which is usually removed after 2–4

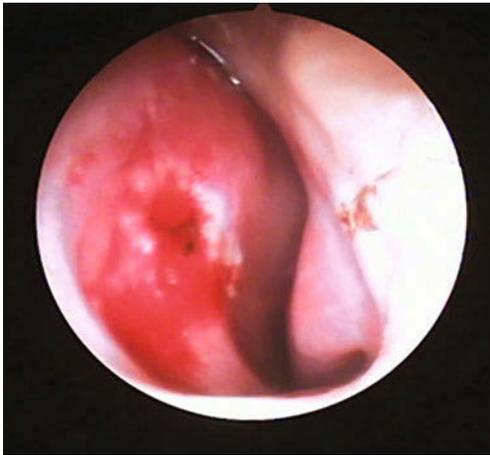
Figure 1



Suction diathermy probe (coagulator).

Figure 2

The left nasal cavity of a 14-year-old patient with dilated arteriole on mild septal ridge.

Figure 3

The same nasal cavity of the same patient immediately after application of bipolar diathermic cautery.

Figure 4

The same nasal cavity of the same patient 6 months after bipolar diathermic cautery.

h. Patients were instructed to use topical emollient and bactericidal creams for 2 weeks after the procedure. All patients were followed up on regular monthly visits for 6 months in the outpatient clinic, and they were assessed as regards further bleeding, complications, or readmission to the hospital secondary to their bleeding problem. Patients with bleeding tendency were referred after the procedure to their pediatricians to deal with their general bleeding problem.

The study was approved by the Institutional Review Board at El-Minia University. Although the study involved no deviation from the existing standard therapy for these patients and no new drugs, individual consent was taken from parents of each patient after explanation of the procedure.

Statistical analysis

The statistical package for the social sciences (SPSS; SPSS Inc., Chicago, Illinois, USA) was used for data analysis. Mean, median, and SD were used to describe quantitative data. Qualitative data were summarized using frequency and percentage. Differences were considered significant when *P* value was 0.05 or less.

Results

Patient characteristics

During the 24-month study period, 75 pediatric patients with recurrent epistaxis completed the study and were evaluated and treated with the use of bipolar coagulation diathermy. There were 40 (53%) boys and 35 (47%) girls with a mean age of 8 years (range 6–15 years) included in the study. Eighteen (24%) patients presented during the spring, 20 (27%) patients presented during the fall, seven (9%) patients presented during the winter, and 30 (40%) patients presented during the summer (Table 1).

Associated signs and symptoms

Nasal congestion, mouth breathing, and headache were reported in 30 (40%), 35 (47%), and 10 (13%) patients, respectively. The side affected was unilateral in 65 (87%) patients and bilateral in 10 (13%) patients. Of the unilateral cases, 30 (40%) patients were affected on the right side and 35 (60%) patients on the left side. A history of nasal trauma was reported in 10 (13%) patients and history of failed nasal cautery with silver nitrate was reported in 40 (53%) patients (Table 1).

Laboratory evaluation

Anemia (defined as hemoglobin of less than 12.0 mg/dl or hematocrit less than 36.0%) was identified in 45 (60%)

patients. Abnormal coagulation values were identified in 15 (20%) patients: prolonged aPTT alone was seen in five (7%) patients, prolonged PT alone in four (5%) patients, combined prolonged aPTT and PT in three (4%) patients, and thrombocytopenia alone in three (4%) patients (Table 2).

Duration and frequency of bleeding

The duration of bleeding was specified in 50 (67%) patients. The mean duration of epistaxis was 24.5 months. Twenty (27%) patients reported a history of repeated epistaxis lasting less than 12 months, whereas 30 (40%) repeated epistaxis lasting greater than

Table 1 Characteristics of enrolled patients

Data	Value [n (%)]
Age (years)	
Mean	8
Minimum	6
Maximum	15
Sex	
Male	40 (53)
Female	35 (47)
Comorbidities	
Nasal congestion	30 (40)
Mouth breathing	35 (47)
Headache	10 (13)
Otitis media	10 (13)
Allergic rhinitis	15 (20)
Asthma	10 (13)
Prematurity	5 (6)
CT findings	
Sinusitis	40 (53)
OMC occlusion	13 (17)
Adenoid hypertrophy	20 (27)

CT, computed tomography; OMC, osteomeatal complex.

Table 2 Features of epistaxis

Data	Value [N (%)]
Side	
Right	30 (40)
Left	35 (60)
Bilateral	10 (13)
Location	
Anterior	50 (67)
Posterior	25 (33)
Etiology	
Undefined	50 (67)
Trauma	10 (13)
Prolonged aPTT alone	5 (7)
Prolonged PT alone	4 (5)
Prolonged aPTT and PT	3 (4)
Thrombocytopenia alone	3 (4)
Endoscopic examination	
Visible vessels	63 (85)
Crusting	7 (9)
Dry mucosa, ulceration	5 (7)

aPTT, activated partial thromboplastin time; PT, prothrombin time.

12 months. The frequency of epistaxis was specified in 60 (80%) patients. Five (7%) patients experienced epistaxis at least daily, 30 (40%) patients experienced epistaxis at least weekly, and 25 (33%) patients experienced epistaxis at least monthly. Patients with coagulation abnormalities had significantly more bleeding attacks compared with other patients with normal coagulation profile. All these patients had daily attacks of epistaxis ($P = 0.01$) (Fig. 5).

Medical and surgical history

Otitis media, sinusitis, allergic rhinitis, pneumonia, asthma, and prematurity were the most commonly accompanied reported conditions. Thirty-four (45%) patients reported a history of at least one surgical procedure. The most common was adenotonsillectomy in 30 patients, tympanostomy tubes in two patients, and adenoidectomy in two patients. None of the patients with a surgical history reported unusual bleeding during or after their previous surgical procedures (Table 1).

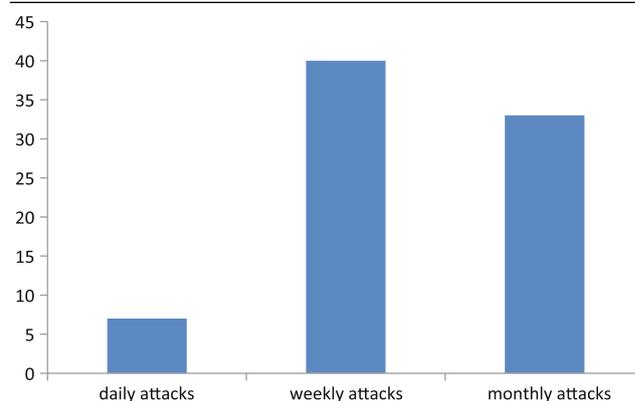
Computed tomography scan findings

Forty (53%) patients demonstrated total or partial opacification of one or more sinus structures. Sinus opacification, mild septal deviation, and adenoid hypertrophy constituted the majority of anomalies detected in patients with abnormal CT scans. The maxillary sinuses were the most frequently involved, followed by the ethmoid, sphenoid, and frontal sinuses. The osteomeatal complex was involved in 13 (17%) patients. None of the scans demonstrated a worrisome mass as a cause of epistaxis (Table 1).

Family history

Five (7%) patients reported a positive family history of recurrent epistaxis in a primary relative.

Figure 5



Distribution of patient percentages on the basis of the frequency of epistaxis attacks before the application of bipolar diathermic cautery.

Medication usage

The most commonly used medications included NSAIDs in 15 (11%) patients, systemic antihistamines in 10 (7.5%) patients, and nasal corticosteroids in 10 (7.5%) patients.

Nasal examination

Visible vessels, crusting, and mildly deviated septum constituted the majority of examination findings in 64 (85%) patients (Fig. 2). Dry mucosa, ulceration of the septum, and friable mucosa were seen in 11 (15%) patients. Fifty (67%) patients were found to have bleeding from the anterior nasal septum on anterior rhinoscopy. Twenty-five (33%) patients had a posterior bleeding point. The posterior nasal septum was the source of bleeding in 20 (27%) patients and the lateral nasal wall at the posterior end of middle turbinate accounted for the remaining five (6%) patients. Ten (13%) patients had bilateral anterior points of epistaxis. Three (4%) patients presented with unilateral active bleeding during the first visit, and the sites of bleeding were cauterized in the same sitting under local anesthesia; other patients were presented in-between their epistaxis attacks.

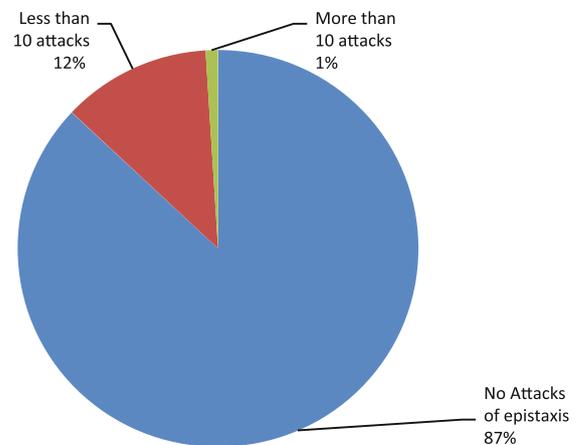
Outcome of the procedure

After application of bipolar coagulation, 65 (87%) patients had no bleeding attacks throughout the 6-month follow-up period with significant improvement ($P < 0.05$). The nasal mucosa at the side of cautery in these patients showed complete healing. Nine (12%) patients with anterior septal bleeding had less than 10 mild attacks of epistaxis during the follow-up period and were controlled with the use of emollient and bactericidal creams for 2 weeks. (All these patients had bleeding tendency: five patients had prolonged aPTT, two patients had prolonged PT, and two patients had thrombocytopenia.) Patients with normal coagulation profile had significantly better results ($P = 0.02$) compared with patients with coagulation defects. Patients with evident sinusitis on CT examination did not show statistical difference compared with other patients as regards the results of the procedure. Only one patient with posterior septal bleeding and thrombocytopenia had recurrent attacks more than 10 times from the same point of previous bleeding after the first trial of diathermic cautery. These attacks were controlled with another trial of bipolar diathermy cauterization and had complete hemostasis in the following 6 months (Fig. 6).

Complications of the procedure

Three (2%) patients had mild erythema at the vestibule of their anterior nares with no adhesions or other intranasal complications.

Figure 6



Distribution of patient percentages on the basis of the outcome of bipolar diathermic cautery during the 6-month follow-up period.

Discussion

The aim of this prospective study was to describe the use of bipolar coagulation diathermy in the management of recurrent pediatric epistaxis. Patients were referred to us with recurrent epistaxis either from the casual department, pediatric department, or directly presented to our outpatient clinic. The approach taken for evaluating epistaxis was the same in all patients. In our study, 67% of patients presented with anterior septal epistaxis and 33% presented with posterior epistaxis, with only five (6%) patients presenting with bleeding from a source in the lateral nasal wall. O'Donnell *et al.* [10] reported that the posterior nasal septum is the main source of recurrent epistaxis in adults.

Sixty percent of the children in our study were anemic, with an incidence higher than that reported in patients with recurrent epistaxis [16]. Anemia usually results from repeated blood loss due to repeated epistaxis, especially if it is accompanied with nutritional problems. However, anemia also can cause epistaxis, especially if it is accompanied by thrombocytopenia (e.g. in aplastic anemia), or if it is accompanied by vasculitis (e.g. in sickle-cell anemia) [17]. None of our patients had such types of anemia, which supports that anemia in our patients was a result of repeated blood loss and other nutritional problems.

In our study, 12 (16%) patients had coagulation defects; these patients had significantly more attacks of epistaxis before and after the application of bipolar diathermic cautery compared with other study patients. Elden *et al.* [18] reported that children with recurrent epistaxis despite medical therapy are at a higher risk of having bleeding disorders. Katsanis *et al.* [19] stated that patients with severe epistaxis were more likely to have multiple bleeding tendencies and multiple trials of cauterization to control their epistaxis. Our

results would appear to underestimate those with a coagulopathy because platelet function testing was not part of our initial screening studies.

Exposure of young children to CT radiation carries a higher risk of radiation hazards. However, Miglioretti *et al.* [20] in a study to assess the use of CT in pediatrics reported that the risk of radiation exposure was higher for patients who underwent CT scans of the abdomen/pelvis or spine compared with that for patients who underwent other types of CT scans with very minimal risk for head CT scans. In our study, it was important to exclude any other possible causes of recurrent epistaxis, especially hidden nasopharyngeal angiofibromas or other angiomatous masses from the nasal septum. Absence of any worrisome neoplasms among our patients' CTs suggests that CT imaging is not necessary as a routine evaluation of recurrent pediatric epistaxis.

Our patients failed conservative management in the form of nasal emollient and antibiotic ointments for months before the enrolment in the present study. An overall 54% of our patients also failed silver nitrates cauterization, and thus they were searching for another treatment strategy for their problem. Studies comparing patients who were treated conservatively and patients treated with silver nitrates reported equal rates of outcome, with the pain being slightly more in the group that was treated with cauterization [21–24]. Only 10 (13%) of our patients required treatment for further attacks of epistaxis; these results compare favorably with the failure rates of nasal packing, which were reported in up to 26% in the literature [25,26]. In our study 50 (67%) patients could be managed on an outpatient basis and 25 (33%) patients required general anesthesia but with a short inpatient time, making this procedure an attractive means of patient management.

Our current study, to our knowledge, is the first to address the use of bipolar coagulation diathermy as an effective tool of management of recurrent epistaxis in pediatrics. Although our study group is small, we are pleased to report that, no patients in the study group had complications. This study opens a new era for a major multicenter randomized prospective evaluation of the use of bipolar coagulation diathermy in the management of refractory pediatric epistaxis.

Conclusion

From our study, we can conclude that the majority of pediatric patients with recurrent epistaxis can be managed effectively and safely as outpatients using bipolar electrocautery. Patients with coagulation defects had significantly more attacks of epistaxis before and after this procedure compared with other patients with normal coagulation.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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