Embolication for control of refractory posterior epistaxis

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Abstract Objectives: Many methods are included in the treatment of intractable epistaxis including selective embolization. We report our experience with 10 patients treated with this technique.
Patients and methods: Ten patients with posterior idiopathic epistaxis were selected in this study. They were managed by double-balloon device followed by embolization.
Results: Study included six males and four females, their age ranged from 49 to 66 years (mean 56 years). Four patients were hypertensive, two were smokers. Epistaxis was unilateral in six patients and bilateral in four. Six internal maxillary and eight sphenopalatine arteries were embolized with polyvinyl alcohol 150–250 \( \mu \)m. Bleeding stopped in all patients after procedure. One patient had recurrent attack 2 months later for whom re-embolization successfully stopped bleeding. No major complications encountered but minor complications occurred in two patients (one severe headache and one transient left temporofacial pain).
Conclusion: Selective embolization is a clinically effective treatment for severe refractory posterior epistaxis. By this method we can avoid the complications of repeated packs and surgery especially in elderly patients.
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1. Introduction

Epistaxis or nasal bleeding has been reported to occur in up to 60% of general population (1–3). Six percent requires emergent medical attention (4,5). About 70% of epistaxis is idiopathic (5–7). Hypertension, hypercholesterolemia, cigarette smoke, alcohol abuse, acetylsalicylic acid and other anti-inflammatory analgesic medications (NSAIDs) and anatomic defects in nasal septum are predisposing factors (1,8). Structural causes include trauma, tumor, vascular abnormalities and bleeding diathesis (9).
Medical management consists of either anterior or posterior nasal packing and the use of local vasoconstrictors. For refractory epistaxis, surgical or endovascular procedures may be indicated (10). Patients with posterior epistaxis of internal maxillary artery origin that failed conservative measures have been suggested as excellent candidates for angiographic embolization (11). The literature for angiographic embolization extends back to 1974 when Sokoloff and others first described the use of this technique in two patients with refractory epistaxis. Since that time, numerous case series have been reported (12,13).

This article outlines our experience with angiographic embolization for the treatment of refractory posterior epistaxis.

2. Patients and methods

Ten patients with idiopathic posterior epistaxis were selected after complete history taking, general and local examinations and complete investigations. Epistaxis was initially managed by packing the nose with double-balloon device for 2 days. In these patients, epistaxis was persistent therefore they were offered the option of embolization.

The double-balloon device was advanced into the affected nostril until reaches the nasopharynx (Fig. 1). The posterior balloon was inflated with 7–10 ml saline and the catheter extending out of the nostril is withdrawn carefully so that the balloon seats in the posterior nasal cavity to tamponade the bleeding source. The anterior balloon is then inflated with roughly 15–30 ml saline in the anterior nasal cavity to prevent retrograde travel of the posterior balloon and subsequent airway obstruction. The balloon packs are left in place for 2 days. After 2 days, the pressure decreased to the middle of the inflated amount and epistaxis was continued in all patients, then the balloon is re-inflated and the patients were referred to interventional radiology unit for angiographic embolization.

The procedure and possible complications were explained to patients, written informed consent then obtained. Embolization was done using biplane DSA machine, Siemens Axiom Artis. Under local anesthesia with 10–15 ml lidocaine hydrochloride 1%, the right common femoral artery was punctured and a 5F sheath introduced. In all patients, selective external & internal carotid angiography was done with 5F headhunter catheter to help localize the source of bleeding and to exclude possible anastomosis to the carotid siphon or ophthalmic artery to avoid the complications of stroke or blindness. A microcatheter (Renegade HI-FLO, 2.8F Boston Scientific) was advanced into the artery of interest to embolize the culprit feeders. The catheter tip was positioned in SPA (eight arteries) or in the most distal part of IMA (six arteries) to avoid embolization of arteries with high potential for dangerous anastomosis, such as the middle meningeal, accessory meningeal, and superficial temporal arteries (Fig. 2). Polyvinyl alcohol particles, 150–250 µm (Contour, Boston Scientific) were injected slowly and under intermittent fluoroscopic control to avoid reflux into non target arteries and to monitor occlusion of the nasal vessels. Control angiography was performed after embolization to assess the results.

If angiography fails to demonstrate any active bleeding with the balloon in place, the pressure of the balloon was reduced to half to help detection of the bleeding site by noting contrast pooling. If no active bleeding noted, then the SPA/IMA was embolized. The balloon is re-inflated and kept in place for 1 day, removed on 2nd post-procedure day, and then patient was discharged on 3rd day. The follow-up period for all patients was 4 months.

3. Results

Six males and four females with a mean age of 56 years (49–66) were included in this study. Four patients were hypertensive and two were smokers. Epistaxis was unilateral in six patients and bilateral in four. Embolization of six IMAs and eight SPAs was done. Bleeding stopped in all patients after procedure. One patient had recurrent attack of epistaxis 2 months later for whom re-embolization was done. Complications reported in our series were severe headache in one patient and transient left temporofacial pain in another one patient which lasted 2 days (Table 1). This patient had previous history of left IMA clipping (Fig. 3). She has perforated nasal septum which mandated LT ICA angiography to exclude bleeding from left ethmoidal branches which could pass through perforated septum to exit from right nostril.

4. Discussion

Management of epistaxis can be very difficult specially when there is posterior bleeding. Treatment options include chemical cautery, anterior & posterior nasal packing, septoplasty with bilateral flap elevation, internal maxillary artery ligation, and external carotid artery or anterior ethmoidal artery ligation.

![Fig. 1](A) Deflated and inflated double-balloon nasal catheter. (B) Diagram shows expected locations of the balloons within nasal cavity (13).
All these measures have high failure rate ranging from 26% to 52% (3,14). Posterior nasal packing is associated with considerable discomfort, mucosal trauma and morbidity due to hypoxia (15). Traditional arterial ligation methods are associated with significant morbidity and failure rates. The transantral approach to the maxillary artery may cause damage to the nasolacrimal duct or infra-orbital nerve and thus cheek anesthesia (3,16). External carotid artery ligation is associated with a risk of damage to hypoglossal and vagus nerves. Moreover, there is high failure rate due to extensive anastomosis distal to the site of ligation (15).

Recent management of epistaxis includes angiography and embolization of the bleeding vessels. Management requires an experienced interventional radiologist which is not available in many centers. Moreover, this procedure may be associated with serious neurological complications (17,18). Angiography and selective embolization are less invasive and faster than open arterial ligation (19). Its advantage is that it offers more distal access to bleeding points, avoids the need for general anesthesia, requires a shorter time for the procedure and allows preservation of other branches of external carotid artery (20). There was an increasing number of embolization done for

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**Fig. 2** Fifty YOM presented with bilateral idiopathic epistaxis refractory to packing. (A) Angiography in AP projection through a microcatheter in IMA (arrow) shows abnormal vascularity along septal and lateral nasal walls. (B) Microcatheter advanced into SPA prior to embolization with PVA 150–250 μm. (C) Post-embolization angiography shows no residual vascular blush. (D and E) Left internal maxillary angiography in AP & Lat projections show nasal hypervascularity. Microcatheter tip was advanced in most distal part of IMA (not shown). (F) Control angiography confirmed absence of vascular blush. Bleeding stopped after procedure.
posterior epistaxis in recent years whereas the number of ligations remains fairly constant. Poor surgical candidates with multisystem disease, prolonged intensive care stays because of multiple medical problems and patient preference to avoid surgical procedure were possible explanation for the increase of embolization (21).

We used double-balloon device system in managing posterior epistaxis as it was effective and less complicated than the packing procedure. Angiography in the presence of nasal packing was not very effective in determining the exact site of bleeding (22). With the balloon device, pressure can be decreased and site of bleeding can be detected on angiography.

Complications related to embolization include cerebrovascular accidents, hemiplegia, blindness, facial nerve palsy, seizures and soft tissue necrosis, the overall complication rate in published reports is around 3–27% (20). The majority of complications reported was minor and transient (19). Other complications encountered included septal perforation, sinusitis, facial numbness and otitis media (7,23–25). None of these complications were noted in our patients except left temporofacial pain in one patient which lasted for 2 days and severe headache in another case.

Rebleeding occurred in one patient after 2 months for whom re-embolization of the bleeding side successfully controlled it. Nathan et al. (13) reported in their series that 13% has recurrence and was controlled with surgical interference. In our series, we embolized the symptomatic side only, no facial artery embolization was performed in any case, and the

Table 1  Presentation, embolization side and complications in 10 cases.

<table>
<thead>
<tr>
<th>Age</th>
<th>Sex</th>
<th>Predisposing</th>
<th>Epistaxis</th>
<th>Embolization</th>
<th>Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>49</td>
<td>F</td>
<td>–</td>
<td>Left</td>
<td>Unilateral SPA</td>
<td>Temporofacial pain</td>
</tr>
<tr>
<td>52</td>
<td>M</td>
<td>HTN</td>
<td>Bilateral</td>
<td>Bilateral IMA</td>
<td>–</td>
</tr>
<tr>
<td>49</td>
<td>M</td>
<td>HTN</td>
<td>Bilateral</td>
<td>IMA + contralateral SPA</td>
<td>–</td>
</tr>
<tr>
<td>51</td>
<td>M</td>
<td>Smoking</td>
<td>Left</td>
<td>Unilateral SPA</td>
<td>–</td>
</tr>
<tr>
<td>52</td>
<td>F</td>
<td>–</td>
<td>Right</td>
<td>Unilateral SPA</td>
<td>–</td>
</tr>
<tr>
<td>54</td>
<td>M</td>
<td>–</td>
<td>Bilateral</td>
<td>IMA + contralateral SPA</td>
<td>–</td>
</tr>
<tr>
<td>61</td>
<td>F</td>
<td>HTN</td>
<td>Left</td>
<td>Unilateral SPA</td>
<td>–</td>
</tr>
<tr>
<td>63</td>
<td>M</td>
<td>Smoking</td>
<td>Left</td>
<td>Unilateral SPA</td>
<td>–</td>
</tr>
<tr>
<td>65</td>
<td>F</td>
<td>–</td>
<td>Right</td>
<td>Unilateral IMA +</td>
<td>Severe headache</td>
</tr>
<tr>
<td>66</td>
<td>M</td>
<td>HTN</td>
<td>Bilateral</td>
<td>IMA + contralateral SPA</td>
<td>–</td>
</tr>
</tbody>
</table>

Fig. 3  Sixty-five YOF presented with intractable RT epistaxis and perforated nasal septum. Left internal maxillary artery was clipped 10 years ago. (A) RT ECA angiography, lateral view shows abnormal nasal vessels and contrast pooling (arrows). (B) After embolization, note microcatheter tip at distal IMA (arrow). (C) Left ICA angiography in lateral projection confirmed absence of bleeding from left ethmoidal branches.
recurrence rate was 10% (1 case). Other authors (10) have shown that the success rate can be increased to over 95% if tri-lateral (bilateral IMA and ipsilateral facial artery) embolization is performed as a preemptive measure to prevent recurrence. However we did not perform this technique to reduce procedure time and complication risk.

5. Conclusion

Angiographic embolization is considered a safe and effective method in the management of refractory posterior epistaxis with 100% initial control rate. It should be considered in the treatment options of posterior epistaxis if technical expertise is available.

References