**Aims:** To present transcaruncular medial orbitotomy as the preferred approach to manage frontoethmoid mucoceles.

**Methods:** 11 patients with frontoethmoid mucoceles received transcaruncular orbitotomy from 2000 to 2002 at the National Taiwan University Hospital. The incision was made through the caruncle to explore the medial wall periosteum. Then the periosteum was opened and extended to provide adequate surgical field exposure. Frontoethmoid mucoceles could be viewed and removed directly. A transnasal drainage tube was inserted before closure of the caruncle wound.

**Results:** The mean follow up period was 12 (SD 9.1) months (range 1–26). Both functional recovery and cosmetic outcome were excellent. There was no recurrence of mucoceles. One patient complained of diplopia, which subsided after 2 months.

**Conclusion:** Transcaruncular orbitotomy provides a wide exposure and a safe access to the medial orbital extraperiosteal space. Furthermore, there is less damage to skin and muscle layer and less manipulation of other ocular adnexal structures, such as medial canthal tendon and lacrimal sac. It can be an excellent approach for the management of frontoethmoid mucoceles.

**Paranasal sinus mucoceles** are slowly expanding cystic lesions with pseudostratified ciliated columnar epithelium. They are caused by obstruction of the normal sinus ostia and entrapment of the secretory epithelium, which continues to secrete mucus, filling the normal aerated space and exerting pressure on the surrounding bony structures. This leads to effacement of the normal septae, expansion of the sinus, thinning of the bony wall, and ultimately extension through the wall into the adjacent orbit, nasopharynx, or cranial cavity. The cysts are usually filled with clear to slightly yellowish thick mucoid secretions.

Most mucoceles arise from the frontal or ethmoid sinuses or both. They occur at any age in both sexes. However, the majority of them are seen between the fourth and seventh decades. Frontoethmoid mucoceles cause outward and downward displacement of the globe, and are often associated with fullness in the superonasal and medial canthal region with a palpable mass. The expanding mass lesion may result in proptosis, eye motility disturbance, diplopia, visual loss, orbital pain, or headache.

Management of mucoceles includes complete removal of the cystic lining, re-establishment of normal drainage, or obliteration of the sinus by mucosal striping and packing with bone or fat. This is usually the domain of the otorhinolaryngologist, but the ophthalmological expertise may be necessary for management of the orbital portion.

There are several surgical approaches to frontoethmoid sinus. The most commonly used approach by the oculoplastic surgeon is that of Lynch. Here, we describe another technique, the transcaruncular approach, which affords a rapid entry to the medial orbit and less damage to the adnexal structures, and achieves superior cosmetic results.

The anatomy relating to transcaruncular medial orbitotomy is shown in Figure 1. The caruncle was divided to dissect a plane between Horner’s muscle and the medial orbital septum to expose the medial orbit, avoiding manipulation of lacrimal sac.

**Figure 1** The anatomy related to the transcaruncular medial orbitotomy. The caruncle was divided to dissect a plane between Horner’s muscle and the medial orbital septum to expose the medial orbit, avoiding manipulation of lacrimal sac.
incision was made through the caruncle using Westcott scissors (Fig 2A). The traction sutures on lateral part of the caruncle incision wound were made by 4-0 silk to provide a wider surgical view. A curved Stevens scissors was then inserted into the incision with the tips placed on the posterior lacrimal crest. Gentle dissection with the tips of the scissors over the posterior lacrimal crest in an anteroposterior direction helped to identify the posterior side of the posterior lacrimal crest (Fig 2B). Blunt dissection with scissors and retraction of the orbital contents with a malleable ribbon retractor resulted in exposure of the medial periosteum and some yellowish mucoid material being encountered (Fig 2C). A Desmarres lid retractor was used at the medial edge of conjunctiva to enhance exposure. The eggshell-like, rounded mucoceles could be palpated after exposure of the medial orbit (Fig 2D). The thin walled mucoceles were easily penetrated with front biting forceps. After the yellowish mucoid material was suctioned out, the thin bone lined lesion was then excised together with the mucous membrane in a piecemeal manner with front biting forceps (Fig 3A and B). The entire mucocele floor was removed and the orbital rim was trimmed to a smooth contour. The mucous membrane was curetted from the sinus lining (Fig 3C). Because the mucoceles were formed by an obstructive sinus process, adequate drainage of the sinus

Figure 2  (A) The first incision was made through the caruncle using Westcott scissors. (B) Gentle dissection with the tips of the scissors passed along the plane between Horner’s muscle and the medial orbital septum. (C) Retraction of the orbital contents with a malleable ribbon retractor resulted in exposure of the medial orbit and some mucoid material encountered (arrow). (D) The eggshell-like, rounded mucocele was shown (arrow).

Figure 3  (A) The outer wall of the mucocele was removed by forceps. (B) Yellowish mucoid material (arrows) was found after removal of outer shell of the mucocele. (C) The inner wall of the mucocele was shown (arrow). (D) A rubber catheter with a balloon (arrow) was inflated after excision of the mucocele.
had to be re-established into the nasal cavity. We did not manage the occluded frontal duct. However, we created a new communication from the frontal sinus through the ethmoid sinus into the intranasal cavity. This was done with the use of a haemostat introduced intranasally that penetrates into the mucocele cavity. The intranasal wall of the ethmoid area of the mucocele was excised; then a rubber catheter could be inserted from the frontal sinus through the ethmoid sinus into the nasal cavity (Fig 3D). The catheter was left in position for at least 7–10 days (Figs 4C, 5C). At the end of the procedure, the caruncle and conjunctiva were closed with interrupted 6-0 Vicryl sutures.

RESULTS
The clinical features of 11 patients with frontoethmoid mucoceles after transcaruncular approach are summarised in Table 1. The mean follow up period was 12 (SD 9.1) months (range 1–26). At the end of follow up, both functional recovery and cosmetic outcome were excellent. No major complications and recurrences were observed. Only transient vertical diplopia was found in one patient after the operation, and diplopia subsided after 2 months. No sequelae were noted in this patient. Possible explanation for this mild complication was minor damage of superior oblique muscle during the surgery.

Here we describe two of our cases.

Case 1
This 31 year old woman had complained left upper medial eyelid swelling for about 2 months (Fig 4A). Visual acuity was 20/20 in both eyes with correction. Intraocular pressures were 13 mm Hg bilaterally. Examination showed a smooth fluctuant, tender mass in the left superior medial orbit. There was no evidence of pulsation or bruit. No lesion was seen in the left superior fornix. Exophthalmometry measurements were the same bilaterally. There was no conjunctival injection or chemosis. Extraocular eye movements were full and free. Visual fields and fundi were normal. Orbital computed tomograph (CT) scan views of sinuses were consistent with a mucocele of the left frontoethmoid sinuses without extension to the orbit and the cranial cavity (Fig 4B).

A transcaruncular medial orbitotomy was performed without complications, and the patient’s postoperative course was uneventful (Fig 4C). Her final result was both cosmetically and functionally satisfactory. No recurrence was found after 26 months’ follow up.

Case 2
For 1 week, this 58 year old man had a sensation of fullness in the left eye, binocular diplopia, and left periorbital dull pain, especially during eye movement (Fig 5A). Visual acuity was 20/20 bilaterally with correction. Intraocular pressures were 15 mm Hg bilaterally. Examination showed a smooth, fluctuant tender mass in the left medial orbit. There was no pulsation or bruit. Hertel exophthalmometry measurements were 14 mm right eye and 18 mm left eye. Primary eye position was left exotropia. Extraocular muscle movements were full and free in the right eye, but showed limitation at upper and medial gaze in the left eye. Visual fields and fundi were normal. Orbital CT scan showed a mass protruding into the
The transcaruncular approach to the medial orbit provides wide exposure and safe access to the medial extraperiosteal space. Potential advantages over the classic transcutaneous incision include more rapid entry into the orbit, less damage to skin and muscle layers, and a better cosmetic result owing to the reduced likelihood of postoperative scarring. Furthermore, there is less manipulation of other ocular adnexal structures such as the medial canthal tendon and lacrimal sac and, consequently, reduced likelihood of damage to theses structures.

Some precautions should be considered to reduce possible complications. The need for careful edge to edge closure of the conjunctiva to decrease the postoperative formation of internal granuloma. Prolonged chemosis or inclusion cyst. As the medial orbit is approached, caution must be exercised to avoid disruption of the lacrimal system. It is important to be constantly aware of the globe and other orbital contents during retraction for adequate surgical exposure. Because mucocele formation is an obstructive sinus process, complete removal of the medial canthus is an important. In our cases, keeping the drainage tube in position at least for 7–10 days is enough to reduce recurrence.

In conclusion, transcaruncular medial orbitotomy is well suited to surgical management of frontoethmoidal mucoceles. Advantages over other approaches include cosmetically satisfactory results, less damage to adjacent tissue, and wide exposure and rapid access to the medial orbit.

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### Table 1 Clinical features of all 11 patients

<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Age</th>
<th>Sex</th>
<th>Laterality</th>
<th>Presenting symptoms and signs</th>
<th>Complications</th>
<th>Follow up (months)</th>
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<tr>
<td>1</td>
<td>31</td>
<td>F</td>
<td>OS</td>
<td>Palpable mass</td>
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<td>26</td>
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<tr>
<td>2</td>
<td>58</td>
<td>M</td>
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<td>51</td>
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<td>63</td>
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<td>OS</td>
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<td>10</td>
</tr>
<tr>
<td>7</td>
<td>34</td>
<td>F</td>
<td>OD</td>
<td>Diplopia</td>
<td>Transient diplopia</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>30</td>
<td>M</td>
<td>OU</td>
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<td>7</td>
</tr>
<tr>
<td>9</td>
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</tr>
<tr>
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<tr>
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<td>55</td>
<td>M</td>
<td>OS</td>
<td>Palpable mass, periorbital pain</td>
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Potential advantages over the classic transcutaneous incision include more rapid entry into the orbit, less damage to skin and muscle layers, and a better cosmetic result owing to the reduced likelihood of postoperative scarring. Furthermore, there is less manipulation of other ocular adnexal structures such as the medial canthal tendon and lacrimal sac and, consequently, reduced likelihood of damage to theses structures.

The transcaruncular approach to the medial orbit provides wide exposure and safe access to the medial extraperiosteal space. Potential advantages over the classic transcutaneous incision include more rapid entry into the orbit, less damage to skin and muscle layers, and a better cosmetic result owing to the reduced likelihood of postoperative scarring. Furthermore, there is less manipulation of other ocular adnexal structures such as the medial canthal tendon and lacrimal sac and, consequently, reduced likelihood of damage to theses structures.

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