

# Combined endonasal and percutaneous endoscopic approach to Pott's puffy tumour\*

Osama El-Silimy

Armed Forces Hospital, Wadi Al Dawasir, Kingdom of Saudi Arabia

## SUMMARY

*The most favourable management of frontal sinus disease and its complications involves the choice of the least invasive operative technique likely to eradicate the disease process. With the introduction of endonasal endoscopic surgery, examination of the frontal recess and removal of obstructive ethmoidal cells or diseased mucosa becomes feasible. Percutaneous frontal sinus endoscopy facilitates sinus irrigation, thorough inspection of the frontal sinus, removal of diseased mucosa within the frontal sinus, and evacuation of subperiosteal abscesses. Six cases of Pott's puffy tumour secondary to frontal sinusitis treated by combined endonasal and percutaneous endoscopic surgery are presented. CT scan is diagnostic for associated complication and underlying pathology. Complications are minimal. Combined endonasal and percutaneous endoscopic surgery is a good approach which can be carried out for the treatment of frontal sinus diseases and its complications.*

*Key words: endonasal endoscopy, percutaneous endoscopy, frontal sinusitis, Pott's puffy tumour*

## INTRODUCTION

The frontal sinus begins as a small bud from the frontal recess and grows up into the frontal bone. The sinus shows a primary expansion with the eruption of the first deciduous molars and again when the permanent molars begin to appear. By the age of 15 years the sinus reaches adult configuration. Full development of the frontal sinus is achieved by the age of 19 years. The sinus is roughly pyramidal in shape with its apex superiorly and base inferiorly. The floor is formed by the orbital roof and, therefore, convex in relation to the sinus cavity. It commonly has a vertical septum, but the presence of several septa is not uncommon.

The frontal recess is located in the antero-superior part of the middle meatus, behind the anterior attachment of the middle turbinate with the lateral nasal wall. Most frontal sinuses drain into the frontal recess and some drain into the ethmoid infundibulum (Kasper, 1936). Other ostia may be seen in this area communicating with *agger nasi*, supraorbital, ethmoidal, lacrimal and infundibular air cells. Because of the extensive variability in the drainage of the frontal sinus, many practising otorhinolaryngologists still feel that the procedures of choice in frontal sinus disease are via an external approach (Wigand et al., 1991). With the introduction of endonasal endoscopic sinus

surgery, endonasal restoration of the normal fronto-nasal communication has become a feasible alternative (Kennedy, 1985; Stammberger, 1986).

Pott's puffy tumour is a localised swelling in the frontal region secondary to acute frontal sinusitis. Subperiosteal collection of pus may be present. CT scan is diagnostic for associated complications, anatomical variations and underlying pathology. Percutaneous frontal sinus endoscopy can aid in proper inspection of the frontal sinus and its frontonasal communications. Six cases of Pott's puffy tumour treated by combined endonasal and percutaneous endoscopic surgery are presented with particular emphasis on the surgical technique.

## MATERIAL AND METHODS

Six patients with Pott's puffy tumour secondary to frontal sinusitis were treated by the author in the period from 1987 through 1993. Four of our patients were on antibiotic cover at the time of presentation (two on erythromycin and two on penicillin V). All patients were put on parenteral antibiotic cover (Amoxil, Flucloxacillin, and Flagyl) prior to surgery. CT scan and plain films were done on an emergency basis for all cases to assess the paranasal sinuses, ostiomeatal complex, frontal region, the orbit and frontonasal communications. The

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surgical technique utilises Hopkins telescopes with different angles (0°, 30° and 70°) and the Messerklinger endoscopic sinus instruments (Stammberger, 1993).

Under general anaesthesia, the patient is placed in the supine position with the head slightly elevated, extended if needed, and turned towards the surgeon, who is seated alongside. Topical surface anaesthesia in the form of 4% lignocaine with adrenalin (1:100,000) is applied to nasal mucosa and middle meatal area. After a few minutes, the medial infundibular wall, anterior middle turbinate area and the area below the medial aspect of the eyebrow overlying the floor of the frontal sinus are infiltrated with 2% xylocaine with adrenalin (1:100,000).

The middle turbinate is subluxed medially to allow adequate visualisation of the middle meatus. Infundibulotomy is then carried out with the sickle knife. The uncinate process is then subluxed medially and removed allowing access to the anterior ethmoid area. The maxillary sinus ostium is then identified by visualisation or by gentle probing and widened with a curette or upward cutting forceps if the maxillary sinus is involved. The anterior ethmoidal cells and ethmoidal bulla are removed (ethmoidectomy). Care must be taken to ensure the removal of all diseased ethmoidal cells. As more superior cells are removed, care is taken to identify the roof of the ethmoid and the anterior ethmoidal artery. The antero-superior insertion of the middle turbinate at the *agger nasi* is removed and the frontal recess cells are removed. The frontal recess is explored using 30°- or 70°-telescopes. After preparing the face and performing temporary tarsorrhaphy, a small stab incision is made in the skin below the medial aspect of the eyebrow down to bone. The periosteum is elevated with the use of periosteal elevator. Subperiosteal abscesses can be evacuated at this stage. The frontal sinus is then opened using a mallet and smallsize osteotome. The hole is enlarged with a punch forceps. The contents is then aspirated, the sinus irrigated and the encountered pus sent for culture. Inspection of the frontal sinus with the aid of telescopes is carried out with special care in visualising the frontonasal communication. Gentle probing with a curved suction cannule endonasally will usually reveal the frontal sinus ostium and verify its patency. Confirmation is achieved by observing the presence of the cannule within the frontal sinus. If the ostium is stenotic, its anterior rim can be enlarged with a curette and a 4-mm Silastic drainage catheter is placed into the frontal sinus and sutured to the septum for six weeks. The anterior middle meatus area is packed with Surgicel to avoid adhesion in that area. The orbital incision is closed with 5/0 Prolene. The following morning, patients are started on nasal toilet, normal saline nasal douches, steam inhalation, topical nasal decongestant and Fucidin cream for 2-3 weeks. All patients are followed up weekly for a period of three weeks following surgery and every two months thereafter.

## RESULTS

Six patients diagnosed as having Pott's puffy tumour secondary to frontal sinusitis were studied retrospectively. The average age was 23.8 years, ranging from 12 to 45 years. The male-to-female ratio was 2:1. Symptoms and signs were severe frontal

headache, swelling in the frontal region, fever, and nasal congestion with or without nasal discharge. The diagnoses and underlying cause were confirmed by CT scan. Medical treatment in the form of topical nasal decongestant and antibiotic cover was carried out with no improvement. One of the patients had bilateral antral wash-out (Figure 1) and daily irrigation by the specialist before referral to us. All culture results were negative. All our patients were cured with no major complication. Only one patient required middle meatus dissection of adhesions in the outpatient department. Subperiosteal collection of pus was seen in only one case.



Figure 1. Clinical photograph showing Pott's puffy tumour. Note the presence of bilateral antral catheter used for irrigating the maxillary sinus before referral to the author.

## DISCUSSION

The main idea of functional endoscopic sinus surgery is based on the assumption that most infections of the paranasal sinuses are rhinogenic, spreading from the nose into the sinus. The common site of infection is the stenotic anterior ethmoid area with infection spreading to the larger sinuses namely maxillary and frontal sinuses (Stammberger, 1986). CT scan has significantly enhanced the scope of endoscopic sinus surgery by offering the surgeon vast amount of previously inaccessible information regarding the sinus status and the ostiomeatal complex (Kaluskar et al., 1993).

Although much of endoscopic sinus surgery has become standardised, the approach to the frontal sinus remains a challenge due to the high degree of variability of the fronto-nasal communication. Wigand and Hosemann (1991) summarised the indications for endoscopic frontal sinus surgery to include: (1) recurrent frontal sinus empyema; (2) chronic hyperplastic frontal sinusitis; (3) extension of nasoethmoidal polypses; (4) muco- and pyoceles; (5) circumscribed benign tumours; and (6) injuries and foreign bodies.

Contra-indications to endoscopic frontal sinus surgery include (Levine et al., 1993): (1) osteomas or tumours; (2) disease that is limited to the lateral most recesses; (3) displaced fractures of the anterior or posterior table; (4) CSF leaks through the posterior table; and (5) extensive osteomyelitis involving anterior or posterior table.

Pott's puffy tumour is a localised swelling in the frontal region, caused by periostitis secondary to acute frontal sinusitis (Figures 1-2). Subperiosteal collection of pus may be present. Plain sinus X-ray may show evidence of acute sinusitis (Figure 3). CT scan is diagnostic for associated complications and underlying pathology (Figures 4-7). Percutaneous frontal sinus trephination for irrigation was described in the literature

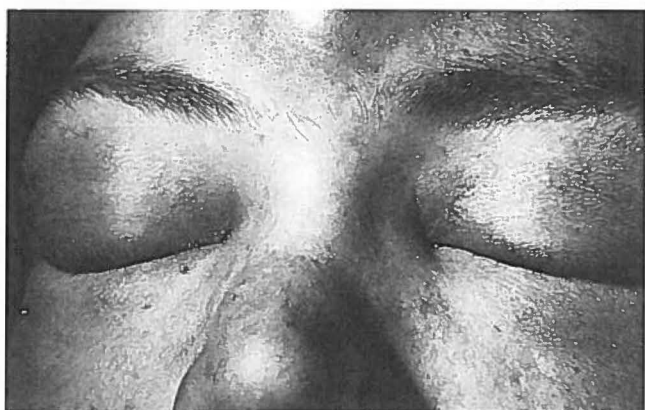


Figure 2. Clinical photograph showing Pott's puffy tumour with bilateral orbital cellulitis.

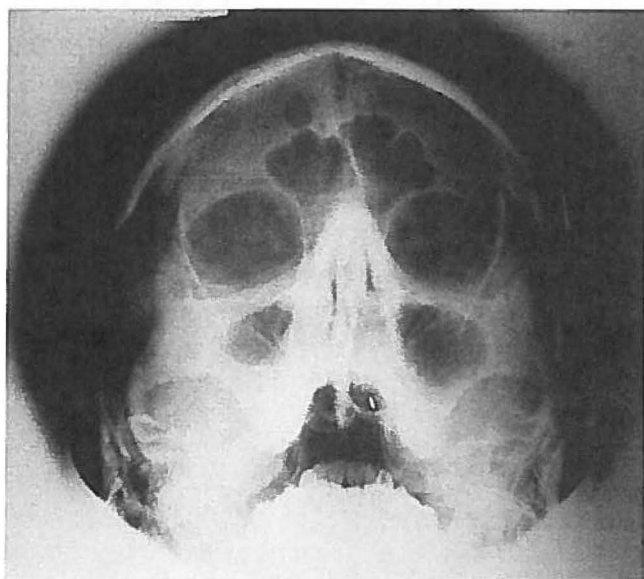


Figure 3. Plain X-ray film showing fluid level in the frontal sinus.

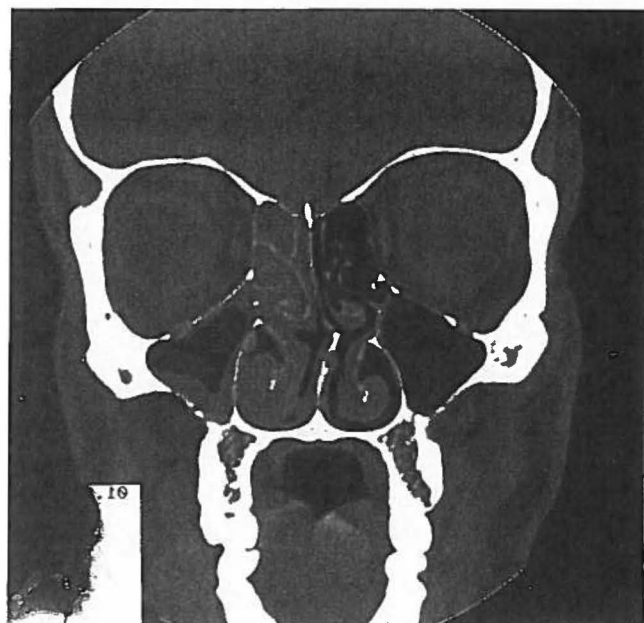


Figure 4. Coronal CT-scan of the paranasal sinuses showing unilateral ethmoidal and maxillary sinuses disease as a causative factor.

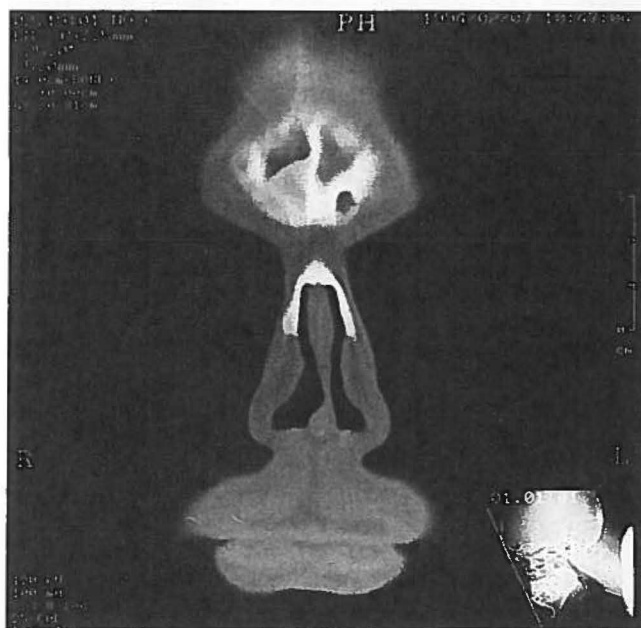


Figure 5. Coronal CT-scan showing fluid level in the right frontal sinus.

for the treatment of acute frontal sinusitis (Fry et al., 1980). Gerber et al. (1993) described the use of percutaneous frontal sinus trephination with endoscopic sinus surgery to facilitate treatment of frontal sinusitis. After adequate endonasal endoscopic removal of the anterior ethmoidal cells and opening the frontal recess, the frontonasal communication may still not be identified.

Percutaneous frontal sinus endoscopy not only provides access for aspiration, irrigation, and subperiosteal abscess evacuation but also provide visualisation to the frontal sinus and the frontonasal communication. Confirmation of the exact site of the frontonasal communication is achieved by seeing the suction cannule inside the frontal sinus. Percutaneous frontal sinus endoscopy will also allow removal of the obstructing

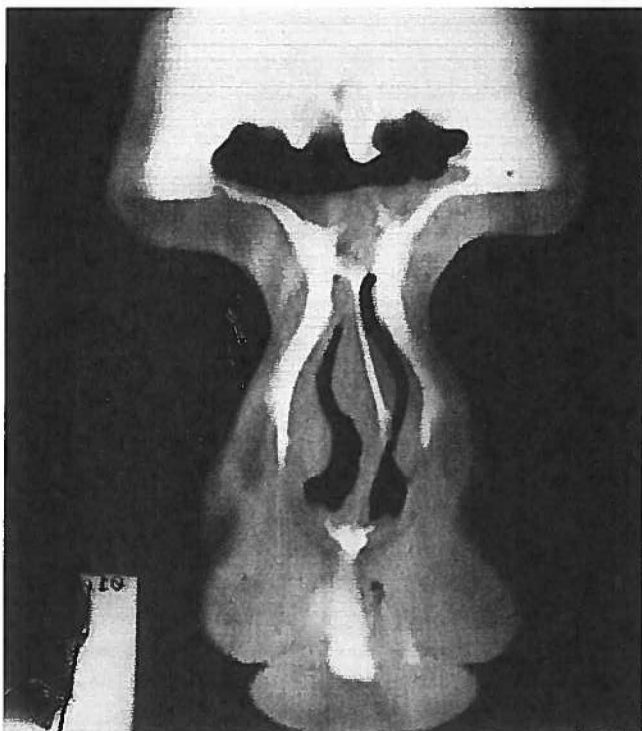


Figure 6. Coronal CT-scan showing fluid level in the frontal sinus.

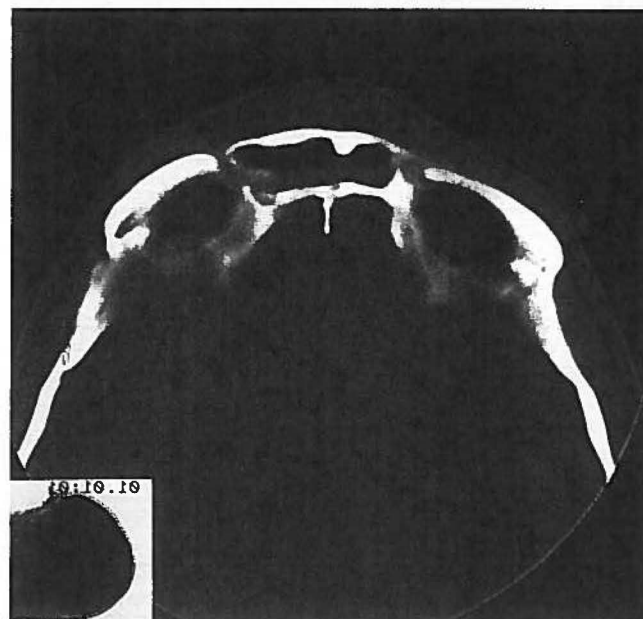


Figure 7. Axial CT-scan showing fluid level in the frontal sinus. Soft tissue swelling (Pott's puffy tumour) is visible anterior to the anterior table.

tissue under direct vision and proper inspection of the entire frontal sinus. Complications of endoscopic sinus surgery in general are minor (Kennedy, 1985). Minor complications include: (1) adhesions; (2) epistaxis; (3) infection; (4) periorbital emphysema; (5) periorbital ecchymosis; (6) dental or lip pain or numbness; and (7) anosmia. Major complications include: (1) CSF leak; (2) orbital haematoma (postseptal); (3) meningitis; (4) brain abscess; (5) focal brain haemorrhage; (6) haemorrhage requiring transfusion; (7) carotid artery injury; (8) epiphora; (9) blindness; (10) diplopia; (11) central nervous system deficit; and (11) death (Maniglia, 1991; Levine et al., 1993).

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Dr. Osama El-Silimy  
19 Grange Avenue  
Stanmore  
Middlesex HA7 2JA  
United Kingdom