Case Report

Two-Hole Trephination (Muntarbhorn) Technique for a Large Frontal Sinus Osteoma: A Case Report

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Objective: *To present an alternative surgical option for frontal sinus osteoma*
Material and Method: *A woman presented with a symptomatic large osteoma in right frontal sinus. Two-hole trephination was planned to remove the osteoma using nasal endoscope and a drill in each hole.*
Results: *The osteoma was drilled and removed transnasally. Two months later, two small fragments of osteoma were detected remaining in the lateral aspect of the sinus. The fragments were removed successfully with the same technique. The patient was asymptomatic six months postoperatively.*
Conclusion: *Two-hole trephination technique or Muntarbhorn technique is an attractive option for frontal sinus osteoma.*

Keywords: *Osteoma, Paranasal sinus neoplasms, Frontal sinus*

J Med Assoc Thai 2012; 95 (Suppl. 11): S168-S171
Full text. e-Journal: *http://jmat.mat.or.th*

Osteoma is the most common fibro-osseous lesion of the paranasal sinuses. It is not an uncommon disease, present in 1% of the subjects with plain radiographs of the paranasal sinuses and in 3% of those with CT imaging for sinus symptoms[1]. The most common location (95%) is the frontoethmoidal region with 95% in frontal sinus and 20-30% in ethmoidal sinus. The pathophysiologic mechanism for osteoma formation is not clear. There are three main theories: embryonic (developmental), traumatic and infectious[2].

As most patients are asymptomatic, they do not require any surgical intervention. However, symptomatic osteoma or an osteoma with rapid growth should be removed. If it is left alone, more symptoms caused by its expansive or compressive effects on nearby structures may lead to more symptoms and complications e.g. more pain, facial deformity, chronic sinusitis, mucocele, pyocele, optic nerve and orbital complications (diplopia, blindness, epiphora), and intracranial complications (subdural abscess, meningitis, frontal abscess, cerebrospinal fluid leak, pneumatocele).

The different surgical approaches for frontal sinus osteoma depend on the locations and size, these include external surgical approaches ranging from 'osteoplastic flap', external fronto-ethmoidectomy to endoscopic endonasal approach *e.g.* Draf III procedure[3-7]. In the present case report, mini-anterior and combined frontal sinusotomy *i.e.* a two-hole frontal trephination[8] was used for removal of a large frontal sinus osteoma in a 49-year-old female patient with chronic frontal headaches. This alternative endoscopic surgical approach was successful in the removal of a large frontal sinus osteoma and should be one of the surgical approaches for serious consideration.

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Case Report

The present case report was approved by the Khon Kaen University Ethics Committee for Human Research.

A 49-year-old female patient was referred from a provincial hospital to the Department of Otorhinolaryngology, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand. In November 2009, she presented with a history of right-sided frontal and orbital headaches for one year. There was no other major nasal symptoms nor orbital symptoms. She had no history of facial trauma or head trauma. Plain films and CT images of paranasal sinuses revealed a large frontal osteoma, 13.9 mm x 16.3 mm x 19.5 mm in size, situated at the lower aspect of right frontal sinus and totally obstructed the ipsilateral frontal sinus drainage

tract with associated frontal rhinosinusitis (Fig. 1). During nasal endoscopy, ipsilateral middle meatus appeared normal without pus and osteoma could not be seen. She underwent surgery on January 7, 2010.

Operative procedure

Endoscopic endonasal surgical removal of the osteoma under general anesthesia was attempted but failed because its location was too anterior posing difficulties. Then, the combined external trephination and endonasal approach were performed by using two-hole "Muntarbhorn" technique" or "Mini-anterior and Combined Frontal Sinusotomy" technique (Fig. 2). This technique started with outline the superior rim of right frontal sinus by measuring its height from coronal view (cut perpendicular to hard palate) of CT images. Lidocaine (1%) with 1:80,000 adrenaline was infiltrated into the soft tissue at the upper aspect of the right eyebrow. Incision was performed at the upper aspect of eyebrow (extension- about one-third to one-half of the eyebrow) with efforts in preserving supratrochlear and supraorbital nerves. Skin and soft tissues including muscles were incised and retracted upwards to expose the superior aspect of the frontal sinus. The sites of drilling the two holes with potential access to the frontal sinus drainage tract and internal 'anterior nasal' spine (fronto-nasal/naso-frontal beak) were marked. A 4-mm cutting burr ('mastoid' burr) was used for drilling and the direction for drilling was slantingly downward inferiorly and slightly medially towards to the frontal sinus drainage tract and the internal 'anterior nasal' spine (fronto-nasal/naso-frontal beak). Two separate 'trephination' holes were very close (each hole about 6mm in diameter; one hole was for intra-frontal sinus drilling and the other was for rigid endoscopy. Thick pus was found in the frontal sinus and frontal sinus drainage pathway was totally obstructed. This osteoma was drilled out using long cutting burrs, 6-6.5 cm in length and its basal origin, just above the frontal infundibulum on its lateral wall, was found and treated. During in-patient postoperative period, she felt improvement without significant sinus pain.

Histopathology of osteoma showed compact bone (ivory), cancellous bone (trabeculae) and fibrous (spongy) tissue, mixed type of osteoma, (Fig. 3). However, two months later she developed right nasal obstruction with purulent rhinorrhea and mild swelling over the right frontal sinus. Endoscopically, pus was evident in the frontal recess. She was treated with amoxicillin/clavulanate for 4 weeks and her symptom was resolved with no pus in frontal recess. Yet, one

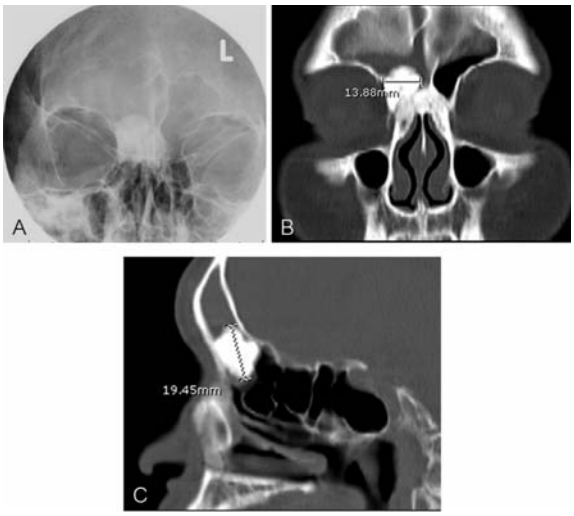

Fig. 1 Showing a large osteoma in plain film (A, Caldwell's view), coronal CT (B) and sagittal CT (C)

Fig. 2 Two holes were drilled slantingly downward at the upper anterior wall of frontal sinus

month later she came back with similar symptoms. Repeated CT of paranasal sinuses showed two bony fragments in lateral aspect of right frontal sinus (Fig. 4). She was re-operated with the same technique. Two bone fragments, 2 mm & 4 mm long with surrounding granulations, were removed. Post-operatively, she was followed-up for 6 months with no nasal symptoms and endoscopic examination revealed resolution *i.e.* good frontal recess and drainage tract without abnormal

secretion (Fig. 5).

Discussion

The authors presented a relatively new and alternative surgical approach for frontal sinus osteoma that could not have been removed solely and entirely by endoscopic endonasal approach. This two-hole trephination approach was first described by Muntarbhorn and Thanaviratananich in 2000[8]. It can also be used for patients with persistent or chronic frontal sinusitis who failed to respond to medications and those with revision cases of frontal sinus surgery. It can also be used among 'difficult sinus' patients *e.g.* those with bony stenosis/narrowing of frontal sinus drainage tract, those whose endonasal endoscopic visual and surgical accesses are insufficient or inadequate and in some revision cases.

There are many advantages of this approach i.e. better visual and surgical access. The osteoma can be seen and can be removed directly using endoscope and accessory instruments including drills, suctions, forceps. The boundaries of frontal sinus including sinus drainage tract can be directly visible. Therefore, iatrogenic injury to periorbita, cribriform plate and other important structures can be avoided. A disadvantage of this technique are the scar at the eyebrow, slightly visible or invisible with make-up. Another disadvantage is the potential postoperative hypoesthesia of the forehead (injury to supraorbital and supratrochlear nerves) and one should always obtain preoperative informed consent.

Acknowledgment

The authors wish to thank (a) Dr. Kanit Muntarbhorn for correcting this manuscript and giving surgical technical advice (b) the Center of Cleft Lip-Cleft Palate and Craniofacial Deformities, Khon Kaen University in association with Tawanchai Project for support and (c) Mr Martin John Leach for assistance with the English-language presentation.

Potential conflicts of interest

None.

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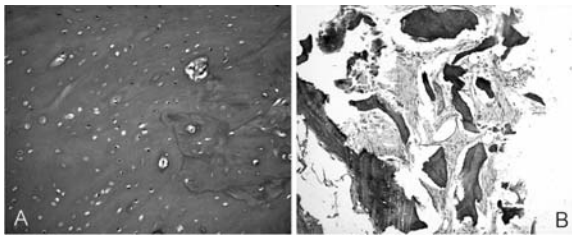

Fig. 3 A. Compact bony tissue: dense, mature, lamellar bone. B. Cancellous bony tissue composed of fibrovascular stroma and thin bony trabeculae (H & E stain)

Fig. 4 Two fragments of osteoma remaining at lateral aspect of right frontal sinus

Fig. 5 Endoscopic view of frontal sinus six months after the second operation

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เทคนิคการเจาะรู 2 รู (เทคนิคมันตาภรณ์) ในการผ่าตัดเนื้องอกของกระดูกขนาดใหญ่ในไซนัสฟรอนทัล: รายงานผู้ป่วย

สงวนศักดิ์ ธนาวิรัตนานิจ, พรเทพ เกษมศิริ, พูนศิริ สีนะวัฒน์

วัตถุประสงค์*: เพื่อเสนอวิธีผ่าตัดทางเลือกสำหรับเนื้องอกของกระดูก (osteoma) ในไซนัสฟรอนทัล*

วัสดุและวิธีการ*: ผู้ป่วยหญิงมีเนื้องอกของกระดูกขนาดใหญ่ในไซนัสฟรอนทัลด้านขวา และมีอาการปวด ได้รับการวางแผนการผ่าตัดด้วยการเจาะรู 2 รู โดยรูหนึ่งใช้สำหรับใส่กล้องส่องจมูก (nasal endoscope) และอีกรูหนึ่งใช้สำหรับใส่ด้ามและหัวกรอ*

ผลการศึกษา*: เนื้องอกของกระดูกได้รับการกรอและเอาออกทางโพรงจมูก ต่อมา 2 เดือนหลังผ่าตัด พบมีเศษกระดูกหลงเหลืออยู่ในไซนัสฟรอนทัลข้างนอก แพทย์ผ่าตัดได้ใช้เทคนิกการผ่าตัดเดิมในการเอาเศษกระดูกออกหลังผ่าตัด 6 เดือน พบว่าผู้ป่วยไม่มีอาการปวดบริเวณไซนัสฟรอนทัล*

สรุป*: เทคนิกการเจาะรูสองรูที่ไซนัสฟรอนทัล หรือที่เรียกว่าเทคนิกมันตาภรณ์ เป็นทางเลือกที่น่าสนใจ สำหรับเนื้องอกของกระดูกในไซนัสฟรอนทัล*