

Versatility of Bicoronal flap approach in Head and neck surgeries

Abstract:

Bicoronal approach popularised by Tessier is one of the versatile approaches for skull and frontal region ⁽¹⁻⁶⁾. In this article we present our experience regarding Bicoronal flap approach in 3 different cases. Each patient had different pathologies in frontal region for which the same approach had been used. We also describe in detail about the incision, its indications and contra indications, advantages and disadvantages. Incision was made in hair bearing area. Hence post operatively, cosmetic results were appealing in all the patients ⁹. It preserves the supraorbital neurovascular bundle, so complaints related to that are avoided. In this article, we discuss about the individual patient, merits and demerits of this particular approach in each patient.

Brief Surgical Anatomy

The layers of the scalp include from superficial to deep: skin, subcutaneous tissue, galea or frontalis muscle, subgalealfascia, and the periosteum. Over the temporalismuscle, the layers of soft tissue are more complicated. Above the temporal line of fusion, which is at the level of the superior orbital rim the layers include: skin, subcutaneous tissue, temporoparietal fascia (facial nerve, and the superficial temporal artery run in this layer), deep temporal fascia, temporalis muscle, and periosteum. Below the temporal line of fusion the layers include: skin, subcutaneous tissue, temporoparietal fascia, superficial layer of the deep temporal fascia, temporal fat pad (middle temporal artery runs in this pad), deep layer of the deep temporal fascia, temporalis muscle, periosteum. For males, the emphasis appropriately focuses on the status of the hairline. In some cases of mild male pattern baldness, the incision may be placed posteriorly to hide it in the remaining hair. The patient should be aware that the incision may become visible if hairline recession continues. It must be ensured that the planned incision will afford adequate exposure for the planned procedure.

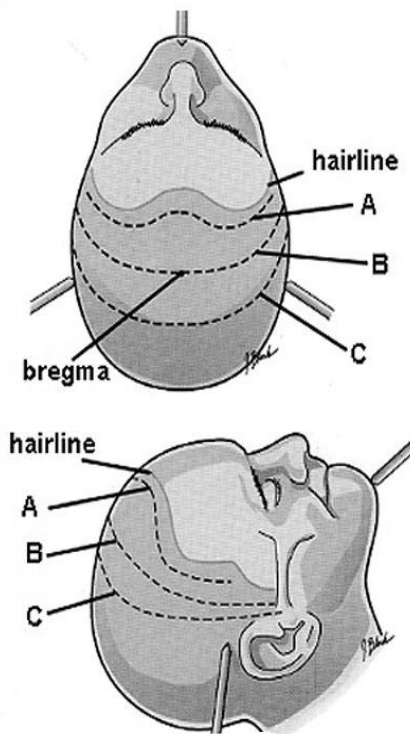
Bicoronal incision:

It is an ideal incision for approach to upper one-third of facial skeleton and the anterior cranium. This extends from one temporal region to the other and involves a major part of the scalp. For this incision, it is recommended to shave the hair for only a strip of 3-4 cms where the incision is to be made. The incision begins at the upper attachment of the helix on one side and extended transversely over the skull to the opposite side. This can be curved slightly forwards at the skull following but posterior to the hairline. The incision is often extended preauricularly to provide access to the zygomatic arches. Initially, the incision is made deep to sub-aponeurotic areolar tissue and the flap is raised along this plane, leaving the periosteum intact. Rarely

clips are applied to the edges of the flap to aid in hemostasis. The periosteum is incised about 3 cm above the supraorbital rim and then the dissection is carried out subperiosteally. This can be carried out until the nasoethmoid, nasofrontal and frontozygomatic region are exposed. The supraorbital neurovascular bundle is freed from the foramen by cutting them at the lower edge of the foramen.

The lateral and temporal dissection follows the outer surface of temporal fascia up-to approximately 2 cm above the zygomatic arch. At the point where the temporal fascia splits into two layers, an incision running at 45° upwards and forward is made through the superficial layer of temporal fascia. This incision is connected anteriorly with the lateral or posterior limb of supraorbital periosteal incision. Because the frontal branch of facial nerve courses obliquely 1.5 cms lateral to the eyebrow and not more than 2 cms above the brow, the connection between the fascia and the periosteal incisions should be at least 2 cms lateral and 3 cms above the eyebrow. The posterior extension of the temporal incision of the fascia is extended to cartilaginous auditory canal.

Once a plane of dissection is established deep to the superficial layer of temporal fascia, the dissection is continued inferiorly until the periosteum of the zygomatic arch is reached. The periosteum is incised and the zygoma, frontal bone, superior and lateral orbital margins, nasal bone and part of parietal and temporal bone are exposed. When hemicoronal incision is planned, this incision will be stopped just short of midline.



Advantages

Maximum exposure of upper one-third of facial skeleton and fronto-parietal region of cranium is exposed by this incision. This helps in management of

- a) Extensive craniofacial trauma
- b) Correction of craniofacial deformities
- c) Single incision allows management of facial trauma and concomitant craniotomy if indicated
- d) Good cosmetic result
- e) Avoids injury to facial structures
- f) Allows harvest and placement of cranial bone grafts

Disadvantages

- a) Loss of hair due to injury to hair follicle in the incision line
- b) Poor scar in case of male type baldness
- c) Inadequate access to middle third of facial skeleton
- d) excessive haemorrhage
- e) Potential for damage of temporal branch of facial nerve resulting in weakness of frontalis muscle.
- f) Post-operative hematoma due to wide dissection of scalp
- g) Sensory disturbance, anaesthesia or paresthesia affecting supraorbital and preauricular region.
- h) Trismus, ptosis and epiphora are also reported.

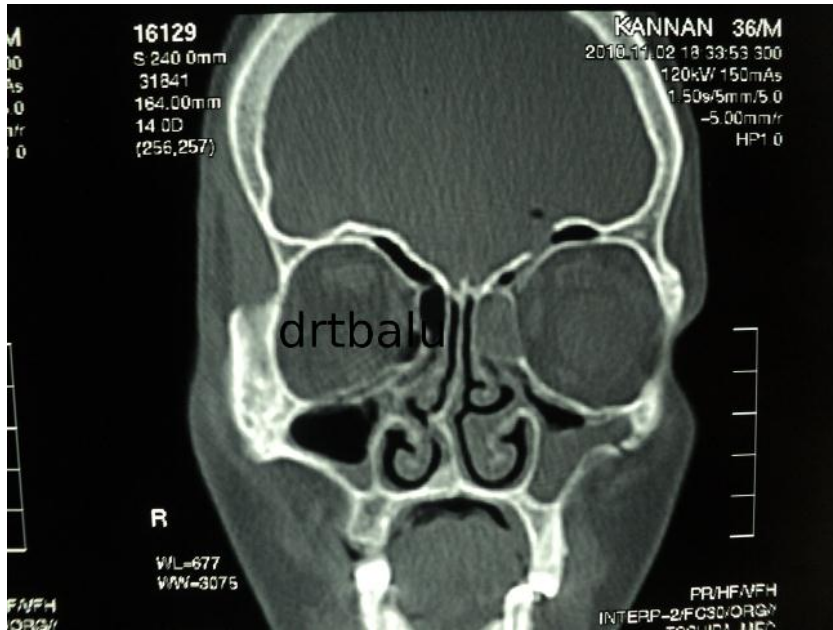
Various methods for hemostasis of bicoronal incisions are

- a) Use of surgical clips
- b) Cautery
- c) Injection of lidocaine with epinephrine

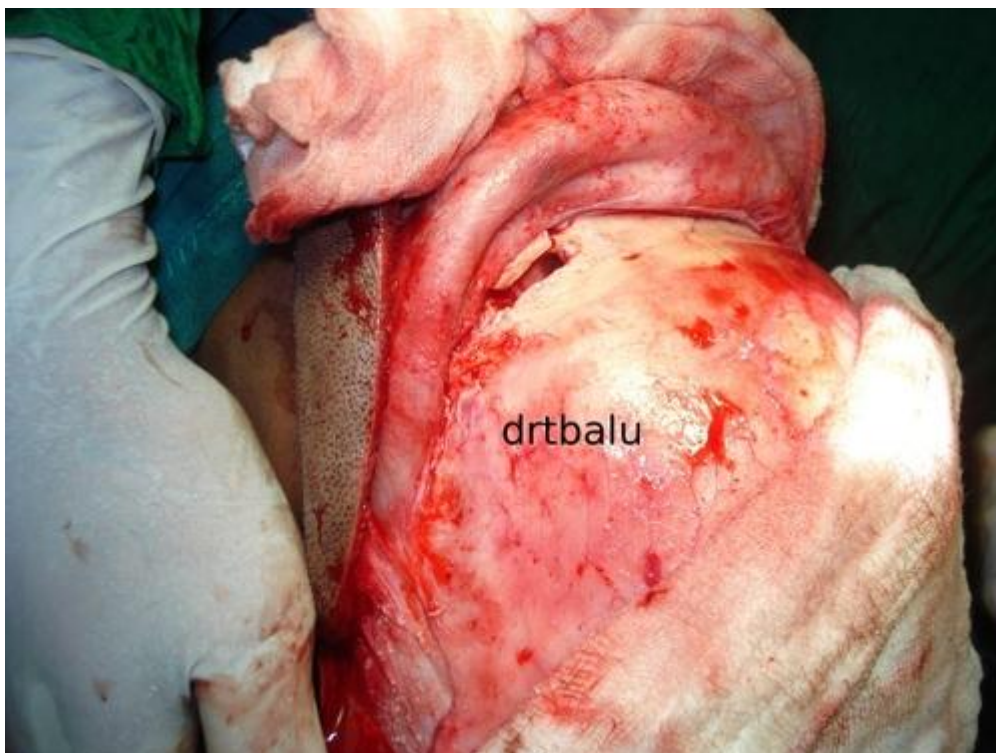
Case report – 1:

This patient is a 30 years old male c/o watery nasal discharge for 3 years. Patient sustained injury by a road traffic accident before 3 years. 1 episode of meningitis + 2 years back.

History: Headache + on and off since then. On examination patient had watery discharge from left nose which got aggravated by bending forwards. CT – paranasal sinuses showed the presence of fracture in posterior table of frontal sinus with pneumatocele in left frontal lobe.



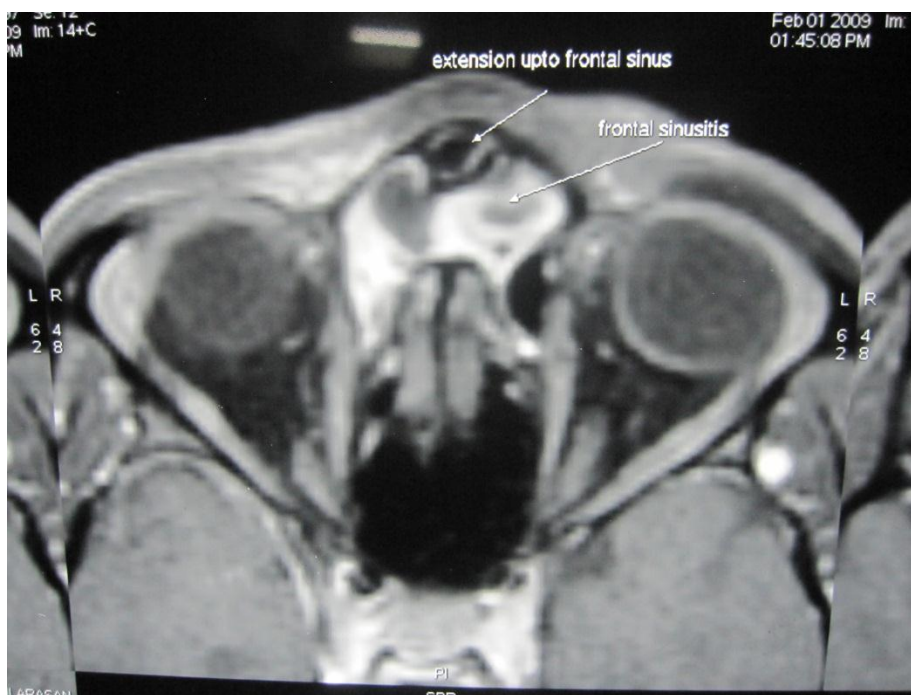
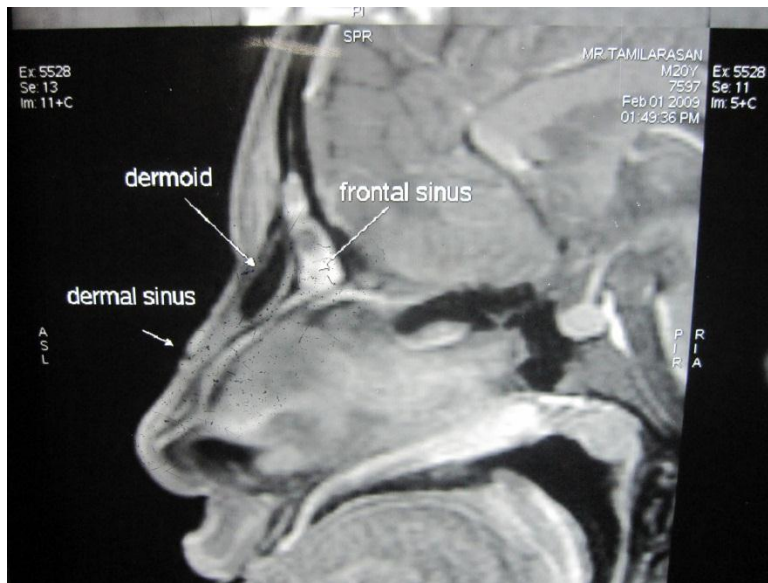
Frontal sinus accessed through bicoronal incision, flap elevated till 2cm of supraorbital ridge. Periosteum was incised at this region and further dissection was done sub periosteally. Anterior table of frontal sinus was identified and the same opened using a fissure burr. Posterior table and the fracture in it was identified, fracture site sealed with tissue glue and abdominal fat.



Case report – 2:

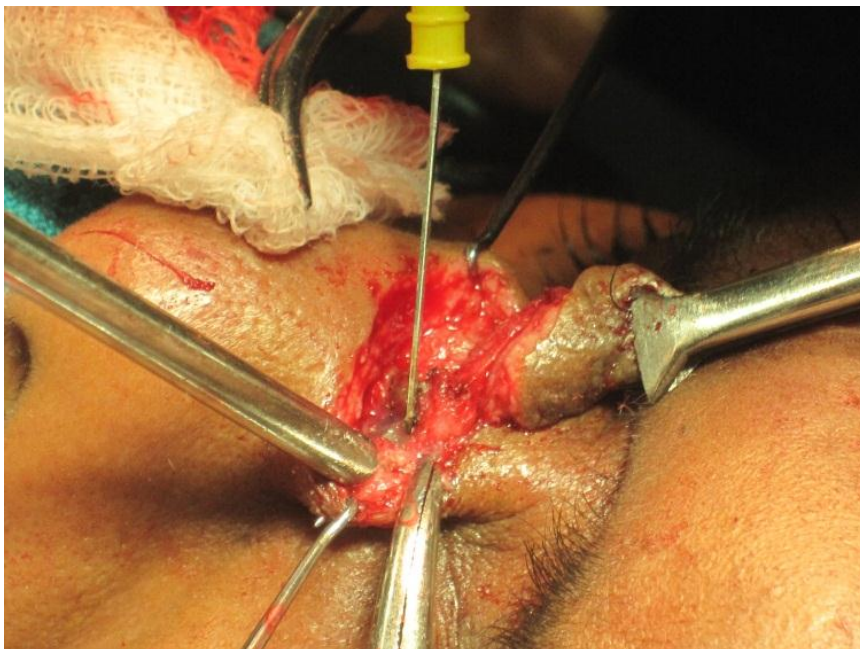
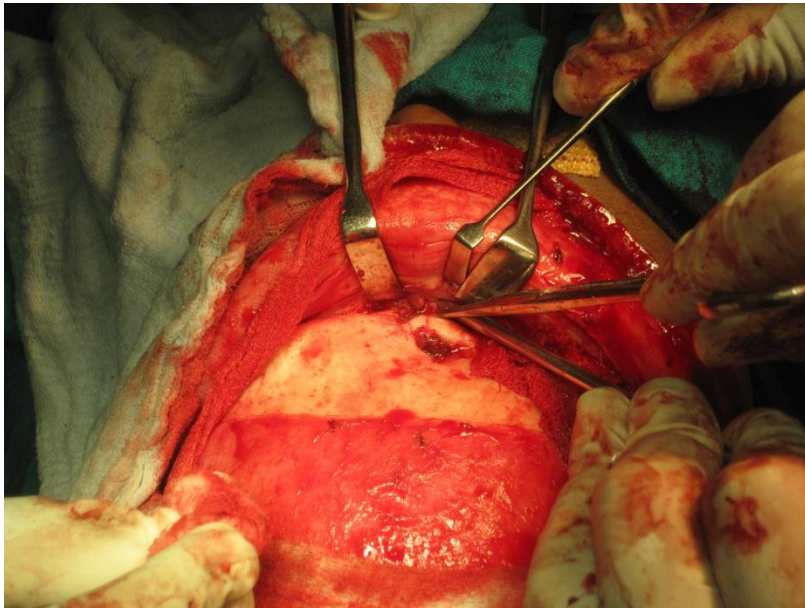
This patient is a 22 years old male who had history of nasal dermoid and osteomyelitis of frontal sinus which was communicating to exterior through a sinus tract in forehead, since childhood. He was operated twice for dermoid excision and removal of sequestrum. During previous surgeries, incision was made over eyebrow. This time patient came with complaints of discharge from sinus tract in forehead region.

MRI shows the presence of nasal dermoid which is connected through a tract to frontal sinus causing osteomyelitis of frontal sinus and which in turn connected to forehead through another sinus tract.



Excision of the dermoid with entire sinus tract and sequestrum through Bicornal flap approach was planned

Picture showing sequestrum in frontal sinus being removed



sinus tract in nose is removed by an incision around the opening.

Complete removal of the entire sinus tract with dermoid and bone sequestrum was possible with this approach. Post operative period was uneventful. Patient was followed up for past 1 year and there was no evidence of recurrence till now.

Case report – 3 :

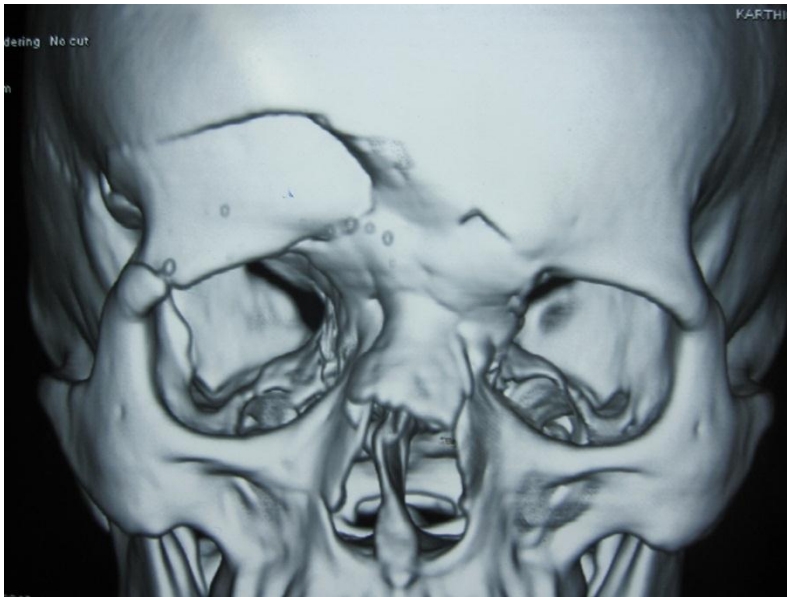


23 year old male patient, who had RTA and sustained depressed fracture of anterior table of frontal sinus along with nasal bone fracture.

CT shows the presence of fracture anterior wall of frontal sinus.

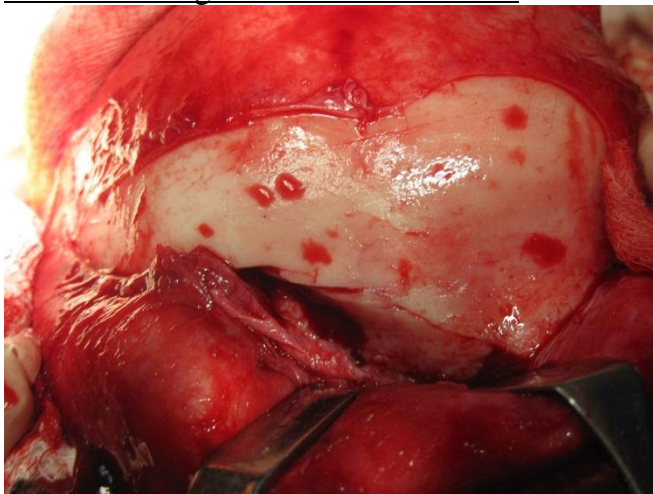


Reconstructed 3D image of skull

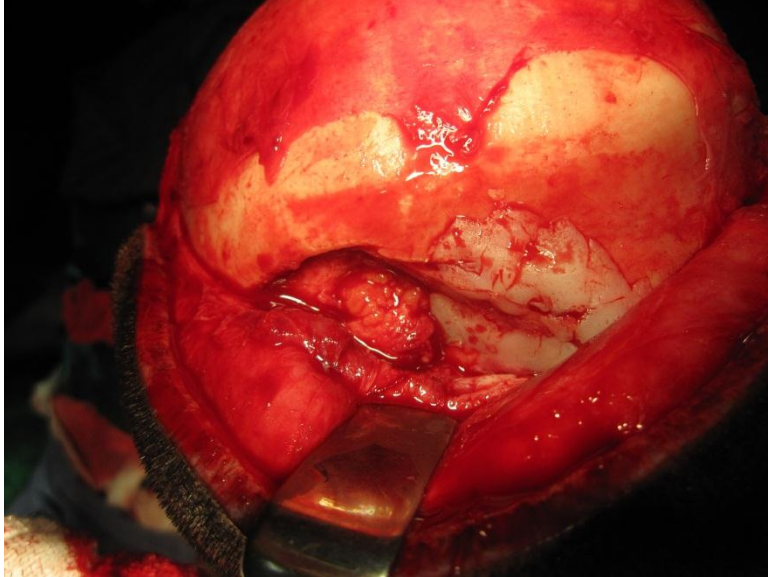


For reduction of fracture in both frontal sinus and nasal bones, Bicoronal flap approach was planned. This single approach was adequate to access both frontal sinus and nasal bones. After elevating the Bicoronal flap, the fracture site identified and reduced after drilling the callus with a diamond burr. Fracture in nasal bone region reduced separately. Frontal sinus was obliterated with fat graft harvested from abdomen.

Picture showing fracture in frontal sinus



Picture showing the frontal sinus after reduction and placing the fat graft.



Discussion:

In all the above mentioned cases, patients were having different pathology in frontal sinus, two of them involving nose also. For all these patients, bicoronal flap approach proved to be more efficient both in terms of access and exposure. There was minimal oedema in first post-operative period which in turn reduced in subsequent days. Even though in literature there were incidence of hair loss due to injury to hair follicles in the incision site¹⁰, we never encountered this complication in our patients. After hair growth there was no evidence of scar and it was cosmetically very appealing.

For one particular patient (nasal dermoid with frontal osteomyelitis) who underwent surgery thrice previously , this approach provided excellent exposure which enabled us to clear the disease process completely. There was no evidence of recurrence for past 1 year. Likewise Fractures of the frontal sinus are a relatively common injury presenting to trauma units that deal with craniofacial injuries.

Approximately one third of frontal sinus fractures affect the anterior wall alone, with two thirds involving the anterior wall, posterior wall, or frontonasal duct. Isolated posterior wall defects were exceedingly rare. Frontal sinus fracture management is still controversial and involves preserving function when feasible or obliterating the sinus and duct, depending on the fracture pattern. In the standard treatment modality of frontal sinus fractures, repair is best performed by way of a coronal approach, which offers excellent access²⁰. Most of the frontal sinus fractures deserve this attentive surgical manipulation to prevent late sequelae of infection or mucocele formation. Thus for our patient, this was the ideal approach for accessing posterior wall of frontal sinus with CSF leak.

This one approach gives better access to all structures in mid facial region.

Conclusion:

The Bicoronal flap is a well-recognised technique for accessing mid facial region. Although the procedure seems to be extensive, it has very less morbidity compared to other procedures to gain access to entire mid facial region. We have attempted this article to review the indication, merits and probable complications of this approach with a brief description about anatomy and the technique as such.

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