NASAL TRAUMA/FRACTURE

Written by Eamon Shamil

Background information

Definitions of levels of care (in this guideline)

- Level 1: Community healthcare worker/non-doctor
- Level 2: Medical doctor
- Level 3: ENT Surgeon

An isolated nasal pyramid fracture accounts for about 40% of all facial fractures. It is essential to exclude concurrent facial fracture and neurological injury in patients presenting with nasal trauma. Delays in management can result in significant cosmetic and functional deformity.

Relatively little force is required to fracture the nasal bones. Most fractures result from laterally applied forces. Greater force is required to fracture the nose with a blow directed from the front as the nasal cartilages behave like shock absorbers.

History

Key issues include:

- How and when the injury was sustained
- Nasal obstruction (with persisting pain may indicate a septal haematoma)
- Change in appearance (based on the patient's own assessment)
- Skull base injury: watery rhinorrhoea or hyposmia
- Orbital trauma: visual disturbance, diplopia, ecchymosis, epiphora
- Temporomandibular joint injury: altered bite, loose teeth, trismus, cheek paraesthesia

Examination and investigations

General

- Inspect the external nose, looking for obvious nasal bone deviation
- Inspect both sides of the internal nose using a pen torch
    - Look for a red, fluctuant swelling on the septum that may indicate a septal haematoma or septal abscess
- Inspect the remainder of the face for obvious deformities – pay attention to the orbit and jaw

Level 1

- Inspect the external nose, looking for obvious nasal bone deviation
- Inspect both sides of the internal nose using a pen torch
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- Inspect the remainder of the face for obvious deformities – pay attention to the eyes and jaw.

Level 2

- Inspect the external nose, looking for obvious nasal bone deviation, bruising or skin lacerations.
- Palpate the external nose, feeling for nasal bone mobility, depression or step deformity
- Inspect and (gently) palpate both sides of the nasal septum using a Thudicum and headlight or pen torch
    - Look for a red, fluctuant swelling that may indicate a septal haematoma or septal abscess. A swelling may be palpated with a Jobson-Horne instrument, or aspirated with a wide bore needle, to distinguish a haematoma from an abscess.
    - Assess the septum for deviation or fracture
- Inspect the remainder of the face for obvious deformities – pay attention to the orbit and jaw

Level 3

- Inspect the external nose, looking for obvious nasal bone deviation, bruising or skin lacerations.
- Palpate the external nose, feeling for nasal bone mobility, depression or step deformity
- Inspect and (gently) palpate both sides of the nasal septum using a Thudicum and headlight

    - Look for a red, fluctuant swelling that may indicate a septal haematoma or septal abscess. A swelling may be palpated with a Jobson-Horne instrument, or aspirated with a wide bore needle to distinguish a haematoma from an abscess.
    - Assess the septum for deviation or fracture
- Inspect the remainder of the face for obvious deformities – pay attention to the orbit and jaw

Investigations

- Plain facial X-rays are not required to make the diagnosis or aid subsequent reduction.
- If there is clinical evidence of a more extensive facial injury, a computerised tomography (CT) scan of the facial bones and brain should be organised if available.
- Samples of any watery rhinorrhoea must be collected and tested for beta-2 transferrin or equivalent test if available.
    - To collect this, we advise patients to lay on a bed, prone, for 15 mins, and allow fluid from their nose to collect into a specimen pot for this time period.

Management

General:

Timing of initial assessment:

- Within first 3 hours, or 4-7 days post-injury (to allow for swelling to go down).

Timing of reduction of nasal bone fracture:

- Refer to doctor if fracture reduction is required
- <3 hours after injury have potential for good results (if minimal oedema is present).

OR

- 7-10 days after injury (after swelling has resolved and before the setting of fracture fragments).

Complications

These should be referred to an ENT surgeon and include:

- Attempts to reduce deformity or improve nasal obstruction are not always successful
- Epistaxis
- Septal haematoma

Level 1

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- Within first 3 hours, or 4-7 days post-injury (to allow for swelling to go down).

Timing of reduction of nasal bone fracture:

- Refer to doctor if fracture reduction is required
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OR

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Complications

These should be referred to an ENT surgeon and include:

- Attempts to reduce deformity or improve nasal obstruction are not always successful
- Epistaxis
- Septal haematoma

Level 2 :

Timing of initial assessment:

- Within first 3 hours, or 4-7 days post-injury (to allow for swelling to go down).

Timing of reduction of nasal bone fracture:

- <3 hours after injury have potential for optimal results (if minimal oedema is present).

OR

- 7-10 days after injury (after oedema has resolved and before the setting of fracture fragments).

Anaesthesia:

- Can be performed under local or general anaesthesia.
- Local anaesthesia:
    - External infiltration along the nasomaxillary groove, infraorbital nerve in its foramen and around the infratrochlear nerve.
    - Intranasal local anaesthetic is also acceptable, using combinations of 5% lignocaine and 0.5% phenylephrine spray (caution in hypertension or cardiovascular disease, maximum dose 8 sprays in adults).
    - Extensive fracture-dislocation of nasal bones and septum and open fractures are not suitable for local anaesthesia.

Technique for manipulation of fractured nasal bones:

- Closed nasal reduction involves first increasing and then decreasing the degree of deformity i.e. an initial slight increase in deformity away from the side of the blow to disimpact the fragments, followed by steady movement back towards and often slightly beyond the midline.
- This can be achieved by firm digital pressure but sometimes instruments are necessary, particularly in those where there has been delay in treatment.
- Closed reduction alone may not achieve a satisfactory result when the final position of the nasal dorsum reflects the deformity of the underlying septum.
- If the bones are fixed, especially if the fracture is older than three weeks, then refer to an ENT surgeon for further assessment and management
- It is advisable to refrain from contact sports for at least 6 weeks after surgery.

Complications

These should be referred to an ENT surgeon and include:

- Attempts to reduce deformity or improve nasal obstruction are not always successful
- Epistaxis
- Septal haematoma

Management of septal haematoma

- Refer to an ENT surgeon

Level 3

Timing of initial assessment:

- Ideal window for assessment is either within first 3 hours, or 4-7 days post-injury (to allow for swelling to go down).
- Delayed intervention of nasal fractures beyond 2-3 weeks post injury makes effective reduction less likely, and sometimes impossible without making osteotomies
- In children, healing can take place even more quickly and earlier intervention is indicated.
- Some patients will have a pre-existing nasal deformity. These patients should be advised that, at best, their nose will only return it to its most recent appearance.

Timing of reduction:

- <3 hours after injury in adults and children has potential for optimal results (if minimal oedema is present).

OR

- 7-10 days after injury in adults (after oedema has resolved and before the setting of fracture fragments).
- 3-7 days after injury in children (after oedema has resolved and before the setting of fracture fragments).

Anaesthesia:

- Can be performed under local or general anaesthesia.
- Local anaesthesia:
    - External infiltration along the nasomaxillary groove, infraorbital nerve in its foramen and around the infratrochlear nerve.
    - Intranasal LA is also acceptable, using combinations of 5% lignocaine and 0.5% phenylephrine spray (caution in hypertension or cardiovascular disease, maximum dose 8 sprays in adults).
    - Extensive fracture-dislocation of nasal bones and septum and open fractures are not suitable for local anaesthesia.

There are easily identifiable groups of patients who are not suitable for reduction under local anaesthesia. Children and patients with low pain tolerance or significant anxiety are better admitted for general anaesthesia. Extensive fracture-dislocation of nasal bones and septum and open fractures are not suitable for local anaesthesia.

Technique for manipulation of fractured nasal bones:

Closed nasal reduction involves first increasing and then decreasing the degree of deformity i.e. an initial slight increase in deformity away from the side of the blow to disimpact the fragments, followed by steady movement back towards and often slightly beyond the midline. Generally, this can be achieved by firm digital pressure but sometimes instruments are necessary, particularly in those where there has

been delay in treatment. Various elevators and forceps can be used including the Freer, Hills and Howarth elevators; and Ashe and Walsham forceps

Closed reduction alone may not achieve a satisfactory result when the final position of the nasal dorsum reflects the deformity of the underlying septum. Segments of the fractured perpendicular plate of the ethmoid or septal cartilage may overlap, requiring repositioning by open reduction. If the bones are fixed, especially if the fracture is older than three weeks, then osteotomies are necessary to release the fragments before manipulation.

It is advisable to refrain from contact sports for at least 6 weeks after surgery.

Occasionally, open reduction or rhinoplasty techniques may be desirable or required to provide optimal results, despite the increased time and effort involved. In indicated cases, open technique offers better exposure and precise approximation of dislocated structures.

Management of the nasal septum

Septal fracture is seen in almost half of nasal bone fractures. This is often missed and is a major reason for poor functional and cosmetic results. A satisfactory reduction of nasal bones is often not possible without improving the position of the septum.

Septal reduction can sometimes be performed with Ashe's forceps, but often requires a Killian or hemitransfixion incision, elevation of mucosal flaps to expose the cartilage and bone fragments, and replacement and/or removal of cartilaginous and bony fragments, as in an endonasal septoplasty. Quilting sutures may reduce the risk of haematoma.

Complications

Attempts to reduce deformity or improve obstruction are not always successful. This is multifactorial, and influenced by pre-existing nasal injury, surgical technique, under-recognition of concurrent septal fractures and postoperative scarring. Some patients inevitably require a septorhinoplasty, which should be delayed by 6-12 months to allow the fractures to heal, oedema to settle completely so the underlying nasal skeleton is evident, and for any fibrosis to develop.

Other complications include:

- Epistaxis
- Septal haematoma

Management of septal haematoma

Septal haematoma presents with acute unilateral or bilateral nasal obstruction and, on inspection, a reddish-purple, fluctuant swelling of the caudal septum. A deviated septum can be confused with a

septal haematoma. Gentle pressure on the bulging area will ascertain that it is fluctuant if a collection is present. Untreated, an abscess may develop and the patient becomes very unwell with a fluctuating fever and severe facial and cranial pain.

The haematoma or abscess must be drained as soon as possible. This can be performed under local or general anaesthetic. Incision and drainage is preferable to needle aspiration; often the collection will have become organised and so impossible to aspirate fully. Once drained, through-and-through quilting sutures are inserted to eliminate the dead space. Packs or splints can be used to provide gentle pressure on the septum. The patient must be re-examined within 48 hours to establish that the collection has not recurred. The management of a septal abscess is similar, but with the addition of intravenous antibiotic therapy. If left untreated, there is significant risk of cartilage necrosis and/or abscess and subsequent saddle nose deformity, columellar retraction and broadened septum, as well as a risk of intracranial infection.

Figure 1) Instruments used in nasal fracture manipulation. (a) Howarth's elevator; **(b)** Ashe's forceps (septum); **(c)** Walsham's forceps (nasal bones). 2) **Determining depth of insertion of instrument into nasal cavity.** The instrument is held so that the index finger of the dominant hand is placed along the instrument in the line of the nose.

Key Points

- Timing of initial assessment is critical and dictates optimal outcome:
    - Within first 3 hours or 4-7 days post-injury
- Timing of reduction:
    - <3 hours after injury in adults and children has potential for optimal results
      OR
    - 7-10 days after injury in adults
    - 3-7 days after injury in children
- Exclude a septal haematoma, and related injuries to facial skeleton, eye and brain, orbit, jaws and central nervous system at initial assessment.
- Most cases can be reduced adequately with closed techniques, unless the fractures are complex or a significant septal fracture-dislocation is present.
- If tolerated, local anaesthesia has comparable results with general anaesthesia in indicated cases.
- Patients should be advised that residual cosmetic deformity and nasal obstruction are relatively common.

Further reading

- Eamon Shamil, Thomas Jacques, Pavol Surda (2022), Chapter 41 'Nasal Fractures', in James England Eamon Shamil *Essentials of Scott-Brown's Otorhinolaryngology*. CRC Press *1st edition*. ISBN 9781138608481,