Purpose

This package is relevant to registered nurses caring for a patient with suspected or confirmed faciomaxillary injury. The purpose of this learning package is to ensure nursing staff are competent in managing a patient with faciomaxillary injury including:

- Assessment and management of a patient with zygomatic, nasal, orbital, maxilla and mandibular fractures
- Assessment and management of injury to the facial and trigeminal nerve
- Assessment and management of injury which causes functional disruption

Objectives

On completion of this package, the Registered Nurse will be able to:

- Outline the anatomy of the facial bones
- Outline the cranial nerves that can be damaged with faciomaxillary injury
- Outline the functional disruptions that can occur due to faciomaxillary injury
- Outline the common mechanisms causing faciomaxillary injury
- Describe the assessment techniques used on a patient with suspected faciomaxillary injury
- Describe the diagnostic studies performed in the patient with suspected faciomaxillary injury
- Describe the nursing management of a patient with faciomaxillary injury
- Describe the conservative and surgical management of a patient with faciomaxillary injury
- Outline the discharge planning required for a patient with faciomaxillary injury

Outline

To successfully complete the package you will need to:

- Complete the questions throughout the package and submit to the assessor in your area
- Describe and then demonstrate your skills in managing a patient with a potential or actual faciomaxillary injury
Introduction

Faciomaxillary trauma can cause cosmetic and functional injury deformities. Injury can affect both skeletal and soft tissue components of the nose, orbit, zygoma, maxilla and mandible and oral cavity. Injury to these components can cause gross haemorrhage which can lead to oedema and airway obstruction causing respiratory distress. As per any trauma patient, rapid assessment of airway, breathing, circulation, disability and environment is essential to stabilise the patient. However, often the treatment of faciomaxillary injury is not seen as a priority and the management of life threatening injuries are managed first.

Hence the aim of care for trauma patients with faciomaxillary injury:
1. To achieve an aesthetically pleasing result both dental and facial
2. To ensure accurate occlusion for effective mastication
3. Return of normal ocular and nasal function
4. Return of restoration of speech

Anatomy and Biomechanics

The facial skeleton is interconnected with many bones supporting one another. The principal facial bones are the frontal bone, nasal bone, maxilla, zygoma and mandible. (1)

Facial bones are relatively thin and are organised in a system of vertical, transverse and horizontal buttresses (2). These buttresses determine the 3-dimensional structure of the face and act as energy absorbing shields to avoid deformation and displacement away from the vital structures and function such as the orbit, airway and brain (2).

Sinus cavities also sit within the face and are found within the maxilla, frontal and ethmoid and sphenoid bones of the skull.

Nerves also extend from the cranial nerves which have a sensory, parasympathetic and motor function. The cranial nerves of concern for the face are the facial nerve (CN VII), trigeminal nerve (CNV), oculomotor (CNIII) and trochlear (CNIV).

Blood supply to the face is plentiful and arises from the external carotid artery (1). The principal vessels that supply the face are the lingual, facial, posterior auricular, superficial temporal, ophthalmic and maxillary arteries (1).
1. Label the diagram below with the appropriate facial bones

<table>
<thead>
<tr>
<th>Components</th>
<th>Face</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zygoma</td>
<td></td>
</tr>
<tr>
<td>Maxilla</td>
<td></td>
</tr>
<tr>
<td>Frontal</td>
<td></td>
</tr>
<tr>
<td>Mandible</td>
<td></td>
</tr>
<tr>
<td>Nasal</td>
<td></td>
</tr>
<tr>
<td>Orbital floor</td>
<td></td>
</tr>
</tbody>
</table>

2. Label the following nerves of the face and state their function as either parasympathetic, motor and/or sensory

- **CN III-Oculomotor**
- **CN V- Trigeminal**
- **CN IV- Trochlear**
- **CN VII- Facial**
3. If the patient can not purse their lips, close their eye, or elevate their eyebrows, what CN injury could be possible?

Circle the correct answer.

- a) CN III - Oculomotor
- b) CN V - Trigeminal
- c) CN IV - Trochlear
- d) CN VII - Facial

4. An injury to the trigeminal nerve (CNV) would result in the patient being unable to

- a) move their eyeball
- b) close their eye
- c) feel hot and cold sensations
- d) all of the above

5. An injury to the oculomotor nerve (CNIII) would result in the patient being unable to

- a) move their eyeball
- b) close their eye
- c) feel hot and cold sensations
- d) all of the above

Sinus

The facial sinuses are air filled spaces which are located within the skeleton of the skull and face. They act to lighten the weight of the skull, humidify and moisten the air we breathe, increase the resonance of speech and act as a crumple zone to the face to protect vital structures.

There are 4 main sinuses in the face.
6. Label the following facial sinuses on the diagram.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Frontal</td>
<td>![Diagram of facial sinuses]</td>
</tr>
<tr>
<td>b) Ethmoid</td>
<td></td>
</tr>
<tr>
<td>c) Maxilla</td>
<td></td>
</tr>
<tr>
<td>d) Sphenoid</td>
<td></td>
</tr>
</tbody>
</table>

**Mechanism of Injury**

Faciomaxillary injuries can result from both low and high velocity forces. Motor vehicle accidents (MVA) and assaults remain the most common cause of facial fractures and occur most commonly in males (1). Falls in the elderly and children are also common. Facial injuries can also result from workplace and sporting injuries.

Although airbags, seatbelts and laminated windscreens in cars have significantly reduced severity of facial trauma, facial injuries such as lacerations, abrasions and chemical burns remain common associations with MVA’s (1).

Penetrating injuries from guns, knives and other impaling objects also can cause facial trauma, although not as frequent.
Types of Injuries

Faciomaxillary Injuries resulting from the above mechanisms can cause fractures, soft tissue damage as well as disruptions to paranasal sinuses', facial nerves and blood supply.

7. Label the facial fractures below

<table>
<thead>
<tr>
<th>Facial fractures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasal</td>
</tr>
<tr>
<td>Zygoma</td>
</tr>
<tr>
<td>Orbital floor</td>
</tr>
<tr>
<td>Mandible</td>
</tr>
<tr>
<td>Le Forte I</td>
</tr>
<tr>
<td>Le Forte II</td>
</tr>
<tr>
<td>Le Forte III</td>
</tr>
</tbody>
</table>
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Assessment and Diagnosis of a Faciomaxillary injuries

The first priority is to ensure life threatening injuries are assessed and managed and the patient is stabilised. This is achieved through the primary survey (DRABCDE).

On secondary survey, not only should soft tissue and bony structures be assessed, but the face should also be assessed for functional and sensory disruptions. Disturbances of vision, smell, nasal breathing, facial sensation and the perception of bite are key functional pathways that lead to the diagnosis of specific facial fractures (2).

Occular assessment should also occur to diagnose any sensory or functional disruptions to the eye.

On inspection, the symmetry of the face as well as protruding or sunken eyes, cerebrospinal fluid (CSF) leak, nasal deformities and intraoral assessment to identify loose teeth, bleeding or swelling should be assessed. Deep lacerations around the cheek and over the jaw should also alert the assessor to potential injury of the parotid gland.

On palpation, any tenderness, step off irregularities, stability of the midface could indicate facial fractures. Subcutaneous emphysema in the face may indicate injuries within the orbit, oral or nasal cavity with resultant filling of soft tissues with air.

The cranial nerves including the facial nerve can also be assessed for sensory and motor function and the ear should also be assessed for any injury.

Radiology including plain Xray and CT are commonly used to assist with the assessment and management for patients with faciomaxillary injury.

Ultrasound, angiography and MRI also have a place when diagnosing faciomaxillary injuries.
8. Above are the CT scans of your patient. After completing a physical assessment of the face, including inspection and palpation, and the function of the orbit, nose and mouth, list the findings that you may identify with these injuries on CT.

____________________________________________________________

___________________________________________

Management of Facio maxillary injuries

9. The most common facial fracture is
   a) Mandible
   b) Orbit
   c) Zygoma
   d) Nose
   e) Maxilla

10. Most patients with faciomaxilla injuries do not go to theatre for 3-5 days post injury. This is because
   a) They have not fasted
   b) Need to wait for swelling to decrease
   c) Need to manage more life threatening injuries first
   d) Need injuries to declare their status
   e) B&C

11. Outline the indications for a tracheostomy insertion for a patient who has sustained facio maxillary injuries

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________
Nasal fractures can be classified and therefore are managed according to the severity of the fracture, displacement and communication with surrounding structures.

The patient with a nasal fracture may present with periorbital ecchymoses, subconjunctival haemorrhage, nasal congestion, oedema, epistaxis, loss of smell and CSF rhinorrhoea.

Generally if there is no displacement and communication with surrounding bones and sinuses, the fractured nose can be treated with __________________________.

However, if the fracture involves greater deformity and displacement and communicates with the ethmoid sinuses or if the cribiform plate is affected and the dura is torn, __________________________, __________________________ and __________________________ may be required.

12. List some points to consider for nursing management. I.e. Sit upright

__________________________________________________________________________

__________________________________________________________________________

13. Patients who have sustained a fractured nose with ethmoid sinus involvement are instructed not to blow their nose. Blowing their nose can lead to

a) Further bleeding

b) Nasal pain

c) Subcutaneous emphysema and potential for infection or meningitis

d) Packs to dislodge

e) Further fractures and deformity

Mandibular fractures are the second most common injury to the face. These fractures can occur in many points within the mandible. Patients with these injuries will generally present with tenderness and crepitus, decreased range of motion and trismus, malocclusion, asymmetry, swelling and numbness to the lower lip. There also may be fractured or loose teeth, lacerations or contusions in the oral cavity (1).

Management of fractured mandibles usually requires __________________________. It may also involve wiring of the jaw, depending on where the fracture has occurred (1).

14. When picking up your patient from theatre post op. it is handed over he has his mandible wired. Outline the nursing management of this patient, considering their- Airway, Nutrition, Pain management, Oral hygiene

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Zygomatic fractures generally involve a fracture dislocation of the zygomatic bones. Almost all these fractures will include the orbital floor and a division of the trigeminal nerve V2. Generally patients will present with a step deformity and flattening or asymmetry of the cheek, periorbital oedema, subconjunctival ecchymosis and pain which can be exacerbated by mouth opening.

As the zygoma forms the lateral wall to the orbit, patients may also present with diplopia (double vision), ocular proptosis due to swelling or enophthalmos (ocular recession within the orbit). Entrapment of the inferior rectus muscle may occur and anaesthesia of the upper lip, cheek, teeth and gums can also occur. This is known as an orbital floor or ‘blow out’ fracture.

Orbital floor fractures can also include prolapse of medial orbital contents (orbital fat and connective tissue) into the ethmoidal and maxillary sinus.

Generally if there is no displacement or functional impairment of the eye, the management of these injuries focus on __________________and __________________and may not require surgery. If surgery is required, the aim of this is to restore normal face projections ie. Width, height and depth as well as decompress the orbital floor of any entrapped ocular tissue and restore proper orbital volume [2].

15. If the patient has difficulty moving their eye laterally, there could be injury to the

| a) Frontal sinus and infection |
| b) CN III and entrapment of muscle |
| c) CN II |
| d) Facial Nerve |
| e) Trigeminal nerve branch V2 |

16. Outline the nursing management priorities for patients with zygomatic and orbital floor injuries

Maxillary or mid face fractures are generally a combination of fractures involving several facial structures. Maxillary fractures are classified as Le Forte I, II, III. These were named by Le Forte in 1900 when he conducted research on the effect of injury on the craniofacial skeleton. He found that the face will fracture predictably along weak fault lines and classified these into three basic fracture patterns [2].

Patients who present with mid face fractures will present with varying degrees of haemorrhage and oedema. This can impair a patients airway and therefore, the priority management of these patients is airway and haemorrhage control.

Once a patent airway has been established and the patient’s haemorrhage has been controlled, surgery may be required for facial fractures. This generally involves open reduction and internal fixation as well as debridement and washout of any devascularised tissue or bone.
Answer the following questions according to the case study below

A 36 year old male involved in an MCA 60-70kn/hr. Car hit tree.

GCS 14 at scene, denies loss of consciousness, Blood alcohol 0. 1%

Nil cabin intrusion, nil deformity to steering wheel

Seat belt worn

No airbags

Assessment-

Facial bone deformity and crepitis mandible

Lower teeth fractures

Laceration from nose to lip

Flatten nose

R) Subconjunctival haemorrhage

R) Orbital floor step off

Epistaxis

Pain 5-10

Non tender neck

17. Outline the nursing management for this trauma patient's maxillofacial injuries on admission

________________________________________________________________________

________________________________________________________________________

CT Face-

- Bilateral maxillary #’s
- Fluid and gas in maxillary antra
- Communited # through body of mandible
- # through floor of R) orbit
- Nasal bone fracture with slight displacement

18. Circle the Le Forte classification which could be diagnosed from the assessment and diagnostics above

a) Le Forte I
b) Le Forte II
c) Le Forte I
On performing visual acuity observations, the patient notes that he has double vision when looking up. This has not changed from previous examinations, however, patient feels he can not move his R) eye as freely and also has numbness across his R) cheek.

19. Describe what you believe is occurring and also what your actions would be:

________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

The patient goes to theatre Day 5 for an ORIF of maxilla and mandible, removal of loose teeth, repair of lacerations, insertion of plate into orbital floor, internal reduction of nasal bone with external splint applied.

On Day 7 the patient remains an inpatient for other injuries but you note the patient has persistent halotosis, temperature 38.8C and pain when moving his eyes.

20. Discuss what you think is occurring with this patient relating to his injuries and why patients with faciomaxilla injuries are at high risk of this complication:

________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

Congratulations, you have completed the theoretical components of this package.

Please complete the practical components on collar care, collar fitting, head holding and log rolling with your CNE.
References and Bibliography
