Salivary gland trauma is also referred to as salivary gland injuries.

### 4.4.1 Definition

Salivary gland trauma is acute trauma of any major salivary gland. It does not include chronic injury to salivary gland tissue resulting from irradiation, chronic infection or chronic obstruction. These salivary gland conditions are sequelae of other diseases or therapy.

### 4.4.2 Aetiology/Epidemiology

- Salivary gland trauma is uncommon.
- Penetrating trauma: primary reason for acute salivary gland injury, the result of a gunshot or knife wound, or it can be an occupational injury.
- Blunt trauma: mainly caused by acts of violence
- Blast injuries: mostly war or occupational injuries
- Often occurs in multiple-trauma victims and can go unnoticed. Typically, these patients are seen months after the trauma, with chronic sequelae.
- In a broader sense, also as iatrogenic trauma: unintentional facial nerve lesion during salivary gland surgery

### 4.4.3 Symptoms

- Skin laceration and haematoma in the region of a major salivary gland
- Salivary leakage from the wound
- Saliva leakage from scar formation in patients with delayed presentation
- Nerve symptoms: partial or complete, facial palsy or hypoglossal palsy
- Secondary posttraumatic development of a salivary gland swelling due to sialocele formation
- Damage is often overlooked or underestimated, especially when surrounding structures may be injured to the point of being life threatening.
- Damage severe enough to disrupt the submandibular or parotid gland, and have a high probability of being associated with vascular and/or skeletal injury

### 4.4.4 Diagnostic Procedures

- Recommended European standard
  - History, ascertain nature of the trauma
  - Inspection
    - Localisation of injury site
    - Drainage of injury site
    - Excessive swelling in surrounding tissue
    - Effect of eating on the wound
    - Facial palsy
    - In cases of delayed presentation: saliva drainage in the scar region
  - In cases of open lacerations: direct exploration.
    - Sometimes, a facial nerve lesion can be seen directly in the depths of the wound.
  - Otoscopic examination or ear microscopy
    - Ear canal injury
    - Saliva in the ear canal
  - Inspection of the oral cavity (dental and oral cavity injuries)
  - In cases of submandibular injury: assessment of tongue sensation and mobility
  - Inspection of the salivary ducts and massage of the glands
    - Bloody saliva
    - Blockage
  - Cannulisation of the salivary ducts through the natural ostia, using a lacrimal probe or silastic catheter, gently (not with force) to confirm the integrity of the ducts is important.
  - Inspection and palpation of the facial bones including mandible, zygomatic arch and maxilla
  - Alert patients: detailed evaluation of facial nerve function and mastication
- Additional/useful diagnostic procedures
  - Injection of methylene blue into the natural ostium of salivary duct: helpful in cases with difficult determination of the fistula exit, for instance in a parotid–antral fistula to the maxillary sinus.
– Electrodiagnostics of the facial nerve
  • Electroneurography, and in particular, electromyography in an alert patient. Pathological spontaneous fibrillations (do not usually occur until 14 days after injury) in the mimic musculature during electromyography recording (at rest) are a sign of severe nerve lesion. Initially, only significant decrease of electroneurography response and reduced response of voluntary electromyography should be considered a sign of severe nerve lesion (or lesion of certain nerve branches).
– CT scan in coronal and axial views provides the best evaluation of bone structures, soft tissue delineation, and vascular structures.
– MRI is the best tool to evaluate an injured salivary gland.
– To rule out vascular injury: arteriogram, MRA or Doppler studies may be required.
– Sialoendoscopy: optimal to visualise secondary stenosis after injury. It can also be used as interventional sialoendoscopy when the stenosis is dilated endoscopically in the same procedure.
– MR sialography: best imaging tool to visualise the salivary duct system. It is helpful to rule out secondary duct stenosis or to visualise a sialocele.
– Sialography: of limited value, but sometimes necessary in special cases and when MR sialography is not available
– Amylase testing: biochemical analysis of wound or fistula fluid to confirm that it is saliva

4.4.5 Therapy

4.4.5.1 General Aspects

• Acute parotid trauma is usually treated surgically, whereas posttraumatic diseases are often treated conservatively. Due to minimal risk, acute and chronic complications of submandibular trauma are treated in most cases surgically via submandibulectomy.
• Penetrating injury: acute injury should be explored primarily, and injured structure(s) repaired
• Gunshot injuries have a high likelihood of severe tissue damage, infection and tissue necrosis. If the bullet penetrates the salivary gland, a small external wound is commonly associated with a larger intraoral wound. In such cases, wound debridement often needs additional intraoral drainage.
• Posttraumatic secondary sequelae after penetrating injury
  – Chronic salivary fistulas due to parenchymal injuries can be managed conservatively with repeated aspirations and compression, and/or botulinum toxin injection.
  – Chronic fistulas due to duct injuries are more resistant to conservative treatment.
  – Blunt injury: observation, conservative treatment
  – Facial nerve injury: assessment of severity as quickly as possible, because degenerative nerve trauma requires nerve repair immediately for optimal functional recovery

4.4.5.2 Conservative Treatment

The recommended European standard for conservative treatment includes:
• General conservative treatment to reduce saliva flow
  – Pressure dressing
  – Repeated aspiration
  – Parenteral nutrition
  – Antisialogogues
    • Anticholinergic drugs
      – Scopolamine administered via a transdermal patch is effective for 3 days.
      – Atropine sulphate as tablets or drops
        – For adults, 0.4 mg every 4–6 h
        – In children, the suggested dose is 0.01 mg/kg, but generally, 0.4 mg every 4–6 hours should not be exceeded.
      – Cyclophosphamide, adriamycin, vincristine, etoposide (CAVE) chemotherapy: side effects
    – Botulinum toxin injection
      • Botulinum toxin is diluted in a greater amount of normal saline than is used to treat Frey's syndrome:
        – A vial of Botox® is reconstituted with 4 ml normal saline to obtain 2.5 mU/0.1 ml.
        – Alternatively, a vial of Dysport® is reconstituted with 5 ml normal saline to obtain 10 mU/0.1 ml.
        – Between 0.1 and 0.2 ml are injected at each injection point. Four to 10 injections are administered to the parotid gland, depending on the size of the gland, and two to three injections are necessary for the submandibular gland. The injection can be repeated when the effect diminishes, but intervals of 2–3 months between injections should be adhered to minimise the risk of autoantibody development.
    – Radiotherapy
      – To date, low-dose radiation is not offered in any European country, as radiotherapy is reserved mainly for malignant disease. However, it is an alternative in cases in which other conservative therapies fail, and surgery is not possible.
• Development of delayed salivary fistula: confirmation by amylase identification. Conservative treatment is