Mandibular Trauma

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1 Introduction

The earliest account of mandibular fractures is found in the *Edwin Smith Surgical Papyrus*, which was acquired by Smith at Luxor in 1862 and later translated by James H. Breasted in 1930 (Mukerji et al. 2006; Thoma 1944). The papyrus was written sometime in the Pyramid Age (3000–2500 BCE) (Thoma 1944). Breasted's translation of dealing with a mandibular fracture involves the following:

> If thou examines a man having a fracture in his mandible, thou shouldst place thy hand upon it. Shouldst thou find that fracture crepitating under thy fingers, thou shouldst say concerning him: One having a fracture in his mandible, over which a wound has been inflicted, thou will a fever gain from it. An ailment not to be treated. (Rowe 1971)

Therefore, the Egyptians at this time did not have much hope for patients with compound fractures of the mandible. This papyrus also illustrates how treatment of simple mandible fractures in these times consisted of the following:

> Applying bandages obtained from the embalmer, and soaked in honey and white of egg, while wounds were treated by the application of fresh meat on the first day, a method which may well have introduced tissue enzymes and thromboplastins without, one hopes, too many associated bacteria. (Rowe 1971)

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2 The Hellenic Period

In 400 BCE, Hippocrates, also known as "the Father of Medicine," began devising his own methods to treat mandibular fractures. He advocated the use of gold or linen threads to tie teeth on either side of the fracture for fixation (Rowe 1971). He described the following regarding immobilizing and reapproximating fractures of the mandible:

> In fractures of the lower jaw, when the bone is not fairly broken across, and is still partially retained but displaced, it should be adjusted by introducing the fingers at the side of the tongue and making suitable counter-pressure on the outside; and if the teeth at the wound be distorted and loosened, when the bone is adjusted they should be connected together, not only two but more of them, with a gold thread if possible, but otherwise with a linen thread, until the bone is consolidated, and then the part is to be dressed with cerate, a few compresses, and a few bandages, which should not be very tight, but rather loose. (Thoma 1944)

Hippocrates not only taught ways of reducing and immobilizing a fractured mandible but is also credited with devising the technique of reducing a dislocated mandible (Thomaidis et al. 2018). This method, which is still used, is described as follows:

> The patient is put in a lying or sitting position, while an assistant must hold the head tightly in a steady position. The physician grabs the mandible with his two arms from inside and outside the oral cavity, from both sides, left and right, performing 3 manipulations simultaneously. He lifts up the mandible, pushes it backwards while closing the oral cavity, all at once. Painkillers should be given. The mandible should be fixed in its normal position with the aid of bandages. (Thomaidis et al. 2018)

3 The Early Medieval Period

In the period of the Roman Empire (23 BCE–CE 410), the Romans continued to rely on the principles of immobilization and repositioning established by Hippocrates (Rowe 1971). In 30 BCE, Aulus Cornelius Celsus recommended the following technique for fixation after setting the fractured segments of the mandible in place:

> Tie together the two teeth nearest the fracture with a silk thread, or else if these are loose, the next ones. After this a thick compress should be applied dipped in wine and oil and sprinkled with flour and powdered olibanum. This compress is to be fixed in place by means of a strip of soft leather with a longitudinal slit in the middle to embrace the chin, the two ends being tied together above the head. (Thoma 1944)

Furthermore, Celsus instructed his patients to not speak and to adhere exclusively to a liquid diet for several days (Mukerji et al. 2006; Thoma 1944). This is one of the earliest references of "closed treatment," a technique that we use today to manage non-displaced fractures.

Later, in about CE 500, Sushruta, an Indian physician, recorded a conservative method to treat mandibular fractures in his ancient Sanskrit text on medicine and surgery. He recommended using complicated bandaging, manual manipulation, and heat to treat fractures of the mandible (Mukerji et al. 2006; Qureshi et al. 2016).

4 Middle Ages–Early Eighteenth Century

During the Middle Ages, there was little advancement in the management of mandibular fractures. Around the year 1000 CE, Abu Al Qasim Al Zahrawi (Albucasis), one of the greatest surgeons of his time, illustrated principles for mandibular fixation using horizontal wiring adopted from Hippocrates (Thoma 1944).

From the Middle Ages to the early eighteenth century, "barber surgeons" had taken over the management of facial fractures when the Pope "ruled any operation involving the shedding of blood incompatible with the priestly office in 1163" (Mukerji et al. 2006). Therefore, these barbers became a one-stop shop by providing services such as cutting hair, extracting teeth, treating facial fractures, applying leeches, and performing minor surgeries (Mukerji et al. 2006). The barbers adhered to the Hippocratic principles of management of jaw fractures by manually reducing the fractured segments, wiring the teeth adjacent to the fracture site, and immobilizing the jaw with bandages (Mukerji et al. 2006) (see chapter Barber-Surgeons).

The importance of establishing proper occlusion when treating mandibular fractures was accentuated in a textbook written by Roger of Salerno in Italy in 1180 (El-Anwar 2017). Three centuries later, rigid MMF was introduced by Guglielmo Saliceto in 1492, when he described how the surgeon should "tie the teeth of the uninjured jaw to the teeth of the injured jaw" in patients with mandible fractures (Rowe 1971). Saliceto's groundbreaking concept of MMF, which is still used today, would later remain dormant for many centuries, with no accounts of its application until the late nineteenth century.

5 Eighteenth Century

Pierre Fauchard sparked the advent of scientific dentistry in 1728 when he wrote his book *Traité de Chirurgie dentaire* (Rowe 1971; Thoma 1944). Although he did not make direct contributions to management of mandible fractures, his comprehensive literature for the practice of dentistry, which included the development of dental prostheses, inspired others to develop prostheses or splints that would provide more stability in treating mandible fractures (Mukerji et al. 2006; Rowe 1971).

In 1743, Robert Bunon described a mandibular fracture case in which the mandibular bicuspids had been avulsed from the effects of trauma and there was

subluxation of adjacent teeth (Thoma 1944). He replaced the empty space with a piece of ivory containing two holes and crossed threads from the second molar on one side of the fracture to the second bicuspid on the other side and tied it very tightly. By doing so he was able to create a single block and consolidate the loosened teeth, thereby curing the fracture in less than a month (Thoma 1944).

Later in 1779, Chopart and Desault stated in their book *Traite des Maladies Chirurgicale* that mandible fractures may occur at the chin, near the ramus, at the condyle, on one side, or on both (Thoma 1944). They recommended bandages made of "iron hooks previously covered with linen, cork, or lead leaf and placed over the lower occlusal table or the alveolar border and then clamped down with screws and nuts to a plate of sheet iron below the lower border of the mandible" (Thoma 1944). They also described the effects of elevator and depressor muscles on mandibular fragments in their book (Thoma 1944).

6 Nineteenth Century

During this century the importance of proper occlusion in fracture reduction and stabilization, inspired by Roger of Salerno, was elucidated. Its importance has been maintained since, and it is currently well known that there is an increase in postoperative complications if the occlusion is unstable when treating with rigid internal fixation (Ribeiro-Junior et al. 2020).

There was also wide use of splints and bandages in the nineteenth century. In 1805, Boyer recommended the use of cork splints to treat mandible fractures (Thoma 1944). Moreover, Barton recommended applying a bandage made of a roll that was five yards long as a form of fixation in 1819 (Fig. 1). The Barton bandage is still used at times today either pre- or postoperatively (Kademani et al. 2016). Gillespie, in 1836, used a piece of sole leather between the teeth on both sides and passed a bandage around the head and another one around the chin. Following the advent of ether anesthesia (1846), Gordon Buck became the first to apply metallic fixation to a mandible fracture by using intraosseous wiring in the United States in 1847 (Ellis 1993; Rowe 1971; Thoma 1944).

Hamilton introduced the gutta-percha splint in 1855, claiming improved stability over Boyer's cork splint (Thoma 1944). The gutta-percha was heated, molded into wedge-shaped blocks, and placed on each side between the teeth while the jaw was being reduced. Hamilton recommended its use together with a vertical bandage around the head for fractures occurring within the dental arch (Mukerji et al. 2006; Thoma 1944).

In 1858, Hayward designed a metal splint for severely dislocated fractures (Mukerji et al. 2006). The fabrication of this splint involved taking an impression of the lower jaw and making a cast. "The cast was sectioned at the fracture site and the occlusion was realigned. Then, the metal splint was made to the new occlusion and the fractured segments were forced into the splint" (Mukerji et al. 2006).

Fig. 1 Barton bandage

In the early nineteenth century, there was not much improvement in the treatment of mandibular fractures besides the use of splints fabricated from different materials and use of bandages. It was not until Kearney Rogers from New York applied bone sutures to fractures of long bones, which later prompted the use of bone sutures for mandible fractures as well (Fig. 2). The procedure involved a thread being passed inside the mouth through the gingiva and periosteum (Thoma 1944). In 1859, Kinloch describes a case, in the *American Journal of the Medical Sciences*, which involved a compound fracture just anterior to the masseter muscle (Thoma 1944). Treatment with wiring of the teeth and use of bandages was not effective for this case. Therefore, he administered chloroform and via a submandibular approach drilled a hole in each fragment. Then, he used a silver wire to bring the fractured segments together (Rowe 1971; Thoma 1944).

In 1865, Thomas Gunning designed the "Gunning splint" specifically for Mr. Seward, the Secretary of State to Abraham Lincoln who fell out of a carriage and fractured the body of his mandible bilaterally. The Gunning splint was a single piece of vulcanite with a space for eating that was attached to the hard palate and mandible using screws (Mukerji et al. 2006; Rowe 1971). The fabrication of this splint

involved taking impressions of the upper and lower jaws and making casts. The model was sectioned at the fracture site and was realigned into proper occlusion. Then the casts of the upper and lower jaws were put in an articulator to make a model of the splint in wax, fitting the upper and lower jaws so they were partly open which allowed a hole for feeding in front (Rowe 1971). The Gunning splint also provides a means for MMF for the edentulous patient currently (Kademani et al. 2016) (Fig. 3).

Later in 1871, Gurnell Hammond, a London dentist, developed a wire ligature splint to immobilize the mandible. The creation of this splint involved taking an

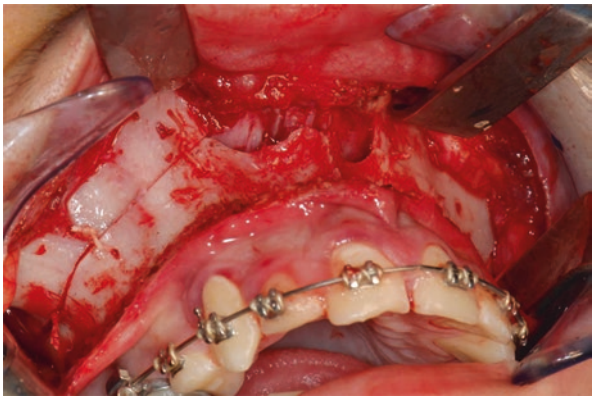

Fig. 2 Bone sutures in a Le Fort osteotomy. (*UT Health San Antonio*)

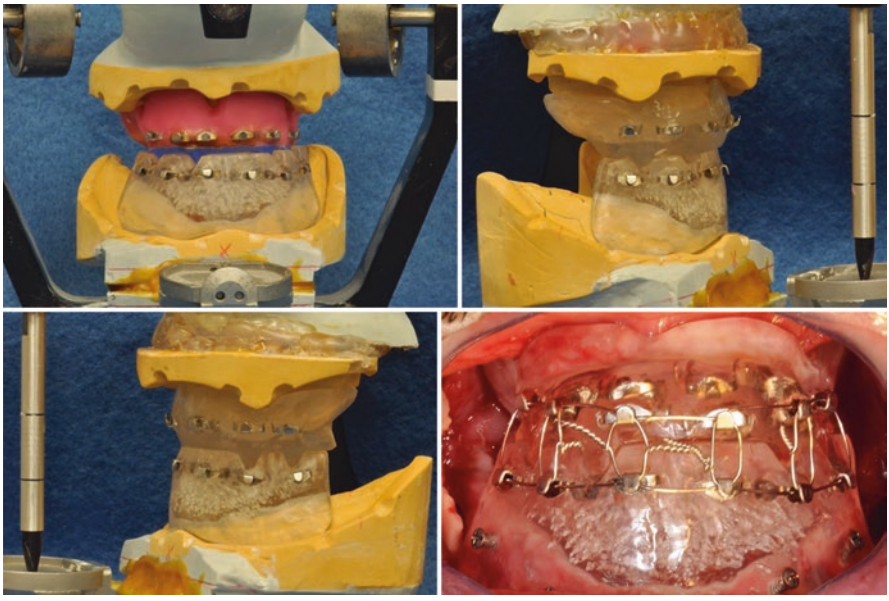

Fig. 3 Fabrication of Gunning splint (present day). (*UT Health San Antonio*)

impression of the lower jaw and casting it in stone. The fractured segments were realigned on the model and then an iron wire was secured to the teeth on the model. The bar was then wired to the patient's natural teeth. This technique is regarded as the predecessor of arch bars and model surgery used today (Mukerji et al. 2006).

Almost a decade later, in 1880, Kingsley of New York fabricated a horseshoe-shaped metal tray which fit the mandible. It had two wires that were soldered to it that extended out of the mouth so that a bandage could be adapted to the wires and pass beneath the mandible. The metal tray was filled with heated gutta-percha and applied over the mandibular teeth (Thoma 1944).

In 1887, intermaxillary ligation was reintroduced by Thomas L. Gilmer (Thoma 1944). He described applying this principle to a case in which his patient had a compound fracture of the right mandibular body and a comminuted fracture of the angle and a part of the lower half of the ramus on the left side. This is the first account in literature of fixation of a fractured mandible by holding the lower teeth in occlusion with the upper teeth by wire ligatures twisted together (Gilmer 1887; Mukerji et al. 2006). He pointed out the value of wiring the lower to the upper teeth in fixation of fractures of the mandible. Gilmer describes his procedure below:

> In each fragment a hole was drilled of suitable size to just admit a No. 16 (standard gauge) platinum wire, which was bent in the shape of a staple; the fragments having been put in place the two arms of the staple were inserted from the lingual surface. These arms were brought together on the buccal surface and tightly twisted, drawing the parts into close apposition. Next, a short steel wire, No. 27, was placed around the neck of each individual tooth of the lower jaw between the second bicuspid on the right and the second molar on the left and the corresponding teeth of the upper jaw. The ends of each wire were brought together and twisted, fastening it securely to the teeth. This being done, the teeth of the lower jaw were exactly articulated with those of the upper by bringing them together and twisting thus firmly lashing the lower to the upper jaw. To prevent lateral motion the wire of the upper left lateral was secured to the lower right lateral; this crossing being continued throughout, held the jaw immovable. (Gilmer 1887)

In 1890, Edward Angle, who is regarded as "the Father of American Orthodontics," contributed to the management of mandibular fractures by introducing special bands that could be placed around the teeth on either side of the fracture instead of using interosseous wiring (Rowe 1971; Thoma 1944). These bands had tiny knobs or tubes which accommodated wires and held the fractured segment in firm contact. For intermaxillary fixation, Angle placed bands on the upper and lower teeth on each side of the fracture and then fixed a wire along the short arms that held the upper and lower jaws together (Thoma 1944).

7 Early–Mid-Twentieth Century

During World War I and II, there were a myriad of soldiers who suffered extensive maxillofacial injuries from shrapnel, bullets, and shells. The fractures involved in these injuries were characterized by comminution and loss of bone in many cases (Fig. 4). Surgeons were put to the test to develop reduction and fixation methods that provided better results than ever before. Consequently, it has been noted that

some of the greatest advancements in the development of treatment methods were made during periods of war. Hippocrates regards war as "the only proper school of the surgeon" (Mukerji et al. 2006).

The use of external fixation devices became popular in this era with many patients presenting with compound, comminuted infected fractures of the mandible (Fig. 5). "The Amex casque, popular with French and British military surgeons, had an adjustable steel band, fitting around the circumference of the head, with adjustable cranial bands and an adjustable perpendicular rod and horizontal face bow"

Fig. 4 Radiograph of comminuted fracture of the mandible. (*UT Health San Antonio*)

Fig. 5 External fixation devices. (*UT Health San Antonio*)

(Mukerji et al. 2006). Its use in facial and jaw reconstruction permitted absolute fixation for either soft tissue or osseous fragments (Mukerji et al. 2006).

During World War I, Varaztad H. Kazanjian used wire sutures through bone fragments and tied the wire to an arch bar for fixation. Kazanjian's method of suturing osseous fragments resulted in great success with managing severely comminuted fractures of the mandible. He also fabricated splints and "internal vulcanized rubber supports that prevented the face from contracting until surgeons were able to graft bone and skin onto the damaged areas" (Mukerji et al. 2006). The wire sutures were removed after about 3–4 weeks. Kazanjian is known for emphasizing the value of various types of prosthetic appliances, which he inserted immediately after injuries to support the tissues while they were still soft and flexible and to prevent unwanted adhesions (Thoma 1944).

Kazanjian is also known for classifying fractures of the mandible by the presence or absence of serviceable teeth in relation to the line of fracture. The classes include the following:

- Class I: teeth are present on both sides of the fracture line.
- Class II: teeth are present on only one side of the fracture line.
- Class III: patient is edentulous (Thoma 1944).

In 1922, Robert H. Ivy modified the intermaxillary fixation technique by creating a loop, or eyelet, in the wire ligature. Ivy loops are normally used for MMF of minimally displaced fractures when the patient has a full dentition, but can also be used when there are only a few stable teeth within the arch (Eusterman 2012; Ivy 1922; Kademani et al. 2016) (Fig. 6). Although percutaneous nailing of fractured longs bones was described by Parkhill in 1897, the use of Kirschner wires in the treatment of mandibular fractures was published in 1932 (Mukerji et al. 2006; Thoma 1944; Vero 1968). Once normal occlusion was achieved, the fractured segments were fixed with a pin inserted transcutaneously (Mukerji et al. 2006).

Fig. 6 Ivy loops. (*UT Health San Antonio*)

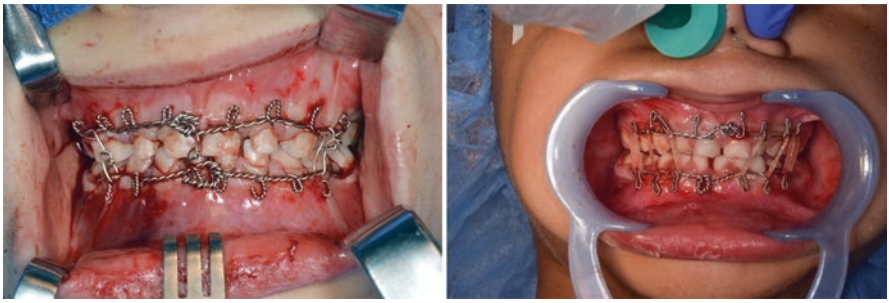

Fig. 7 Risdon wires. (*UT Health San Antonio*)

In 1936, E. Fulton Risdon described a twisted type of arch wiring for MMF (Fig. 7). He described using a wire that was twisted around the last molar tooth of the mandible. The ends were then twisted following the contour of the mandible at the cervical margin of the teeth to the midline. This was accomplished bilaterally. The two twisted ends were then twisted together in the symphyseal region to form a substitute arch bar. Ligature wires were then passed to secure the individual teeth to the bar. This was also done on the maxilla to allow MMF. Additionally, the Joe Hall Morris appliance, which consisted of biphasic external pin fixation, was extensively used during World War II for closed reduction of comminuted fractures of the mandible. This appliance was noninvasive and did not require concurrent MMF (Ellis 1993; Eusterman 2012). Prior to the development of antibiotics, open reduction techniques were not widely accepted due to the likelihood of osteomyelitis or other infections arising postoperatively, which consequently resulted in failure of treatment (Ellis 1993).

7.1 Rigid Internal Fixation

Despite the first application of rigid internal fixation with a plate and screws being credited to Hansmann in 1858, the most significant advances were brought on by Sir William Lane and Albin Lambotte (Gilardino et al. 2009). From 1893 to 1914, they experimented in the field of osteosynthesis with steel plates and screws for internal fixation but struggled with corrosion. The earliest account of the use of true bone plates to treat mandible fractures was by Schede, in 1888, who used a solid steel plate held by four screws. However, it was not until the development of materials more resistant to corrosion that internal fixation for mandibular fractures became more popular (Gilardino et al. 2009).

In 1943, Bigelow was the first to use Vitallium, an alloy of cobalt, chrome, and molybdenum, for mandibular fractures (Mukerji et al. 2006). In an effort to reproduce a material that had the inertness of Vitallium combined with the usability of stainless steel, Leventhal in 1951 proposed the use of titanium for fractures. Whereas

many metals were tested and abandoned for use in treatment of mandibular fractures and facial fractures in general, stainless steel, titanium, and Vitallium became more widespread during the new era of internal rigid fixation for facial fractures (Gilardino et al. 2009).

Following this, in 1949, the Belgian general surgeon Robert Danis introduced the principle of axial compression of the fracture ends (Luhr 2000; Uhthoff et al. 2006). He recognized his goal of achieving compression between the fractured segments using a plate he called the *coapteur*, which "suppressed interfragmentary motion and increased the stability of the fixation." This principle influenced all subsequent plate designs (Uhthoff et al. 2006).

8 Late Twentieth Century

8.1 Compression Osteosynthesis

Luhr developed a compression plate in 1967 which adhered to Danis' principle of axial compression. He is known for performing the first compression plating of the maxillofacial area in the world. Furthermore, he set the foundation for osteosynthesis to be the generally accepted treatment for facial fractures (Luhr 2000). Luhr is also credited with developing self-threading screws, which no longer required pretapping before screw insertion (Ellis 1993; Luhr 2000).

In the 1970s, Spiessl recognized that "chewing tends to distract the dental border of a fracture line, whereas the basal border tends to be compressed." He learned that fixation at the basal border of the mandible does little to overcome the distracting forces occurring more superiorly (Kellman 1995). To address this problem, he advocated using a "tension band arch bar" so that forces applied during chewing could not pull this area apart. He then applied a compression plate along the basal border. In situations where there were no teeth to apply the tension band arch bar, or it was difficult to apply compression forces at the superior area without damaging the tooth roots, the use of an eccentric dynamic compression plate was advocated (Kellman 1995). This type of plate, introduced by Schmoker and Niederdellrnann in 1973, has compression holes directed both horizontally and superiorly (Ellis 1993; Kellman 1995). When applied properly this plate provides compression at the alveolar region through the superior directed screws, as well as the basal border via the horizontal compression screws (Kellman 1995).

An alternative to the use of plates and screws for compression fixation is the lag screw technique which was introduced in 1970 by Brons and Boering (Ellis 1993). This technique is used when fragments of the bone overlap, and it has been shown to work well in the symphyseal and parasymphyseal region of the mandible where there is cortical overlap due to the curvature of the mandible (Kellman 1995). In the case of oblique fractures, at least two screws are required to prevent rotational movements (Ellis and Ghali 1991). In 1991, Ellis and Ghali found that the lag screw

technique results in a simple yet successful way to secure the fragments in a non-comminuted fracture of the anterior mandible (Ellis and Ghali 1991) (Fig. 8).

Finally, the mandibular reconstruction plate was designed to be strong enough to replace a missing segment of the mandible or for cases of comminution (Kellman 1995). These plates are usually placed along the inferior border of the mandible to avoid damaging teeth or neurovascular structures and are placed with bicortical screws to gain additional stability (Kademani et al. 2016) (Fig. 9).

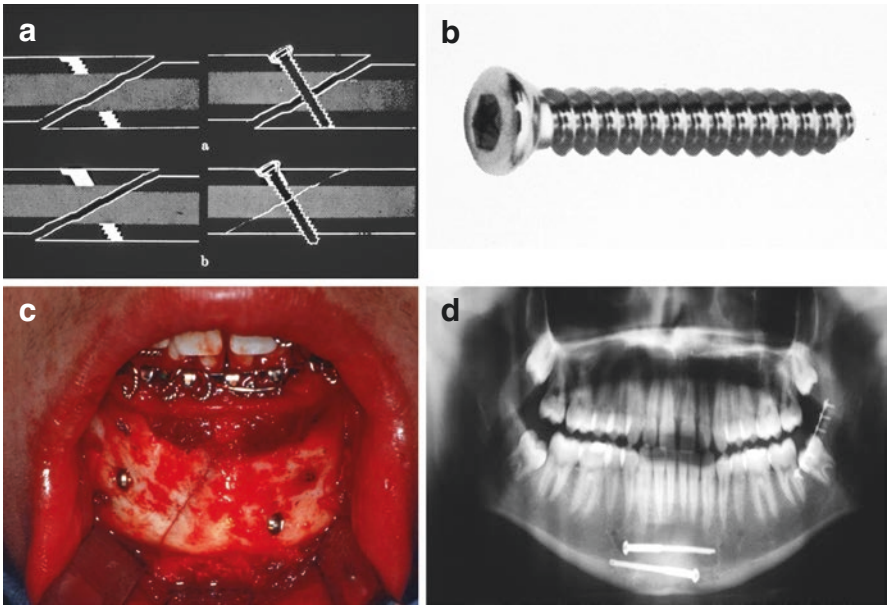

Fig. 8 Lag screws. (**a**) Technique, (**b**) lag screw, (**c**) intraoperative image of lag screw application, (**d**) postoperative radiograph. (*UT Health San Antonio*)

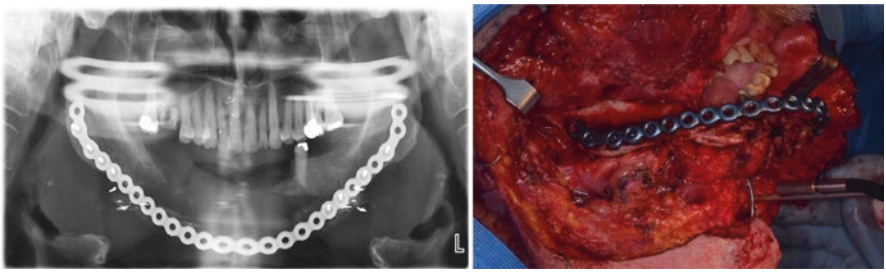

Fig. 9 Mandibular reconstruction plate. (*UT Health San Antonio*)

8.2 *Miniplate Osteosynthesis*

Michelet revolutionized the technique of internal fixation through his introduction of miniplate osteosynthesis in 1973. Before this, surgeons relied on an extraoral approach to treating mandibular fractures due to the large size of compression plates (Ellis 1993). Michelet's technique consisted of using small, non-compression bone plates placed juxta-alveolar and subapical via a transoral approach with monocortical screws.

In 1978, Champy et al., following along the technique of Michelet, advised against the use of compression plates due the following reasons:

1. There is a natural strain of compression existing along the lower border due to masticatory forces.
2. There is an inability to measure the amount of compression created between the two fragments which may lead to bone necrosis.
3. The use of a rigid lower border plate will result in the "shield effect."
4. There is difficulty in reestablishing normal occlusion with use of compression.
5. Compression osteosynthesis requires access through a transcutaneous approach.

Therefore, they advocated the use of very strong miniature and malleable screwed plates in the subapical position without compression. This miniplate is applied with monocortical screws in order to avoid damaging the tooth roots or the nerve (Champy et al. 1978; Ellis 1993).

Champy also described lines of tension along the mandible that correspond with biomechanically favorable regions for osteosynthesis (Champy et al. 1978; Koshy et al. 2010) (Fig. 10). He advised the use of one miniplate in all these areas of the mandible except for the symphyseal region where there are rotational or twisting forces during function (Kellman 1995). He recommended the use of two miniplates in this location. For mandibular angle fractures, he advocated the use of a miniplate along the vestibular osseous flat portion located in the third molar region (Champy et al. 1978) (Fig. 11).

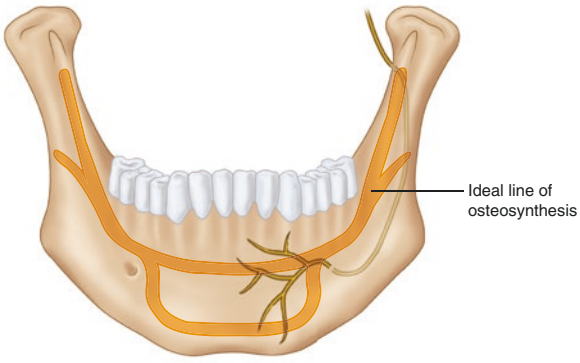

Fig. 10 Champy's ideal line of osteosynthesis

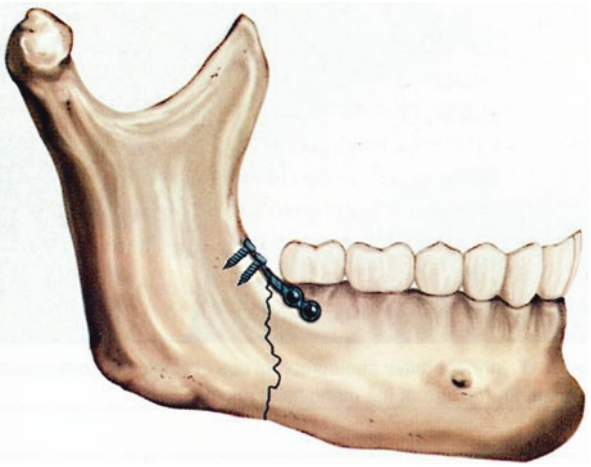

Fig. 11 Champy miniplate

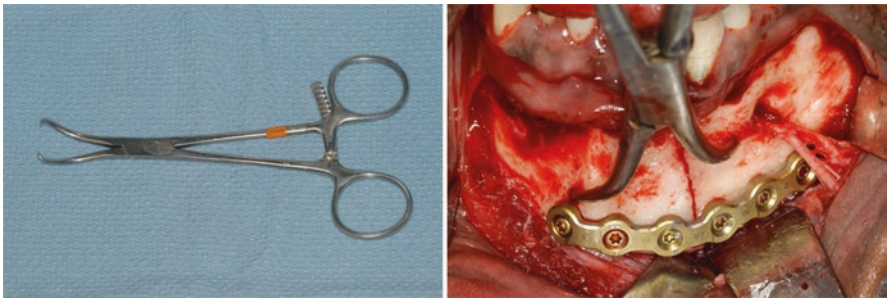

Fig. 12 Bone clamps. (*UT Health San Antonio*)

In 1973, Goode and Shinn described the use of a bone compression clamp, which would shorten or eliminate the need for intermaxillary wiring. It was found that this clamp held the fractured segments of the mandible in good position and promoted bone healing at 4 weeks (Fig. 12). These clamps were attached to the buccal and lingual cortices around the inferior border of the mandible. However, later studies showed how this device did not provide rigid fixation of the mandible and had some slippage (Ellis 1993; Goode and Shinn 1973).

The use of Erich arch bars provided an effective method for MMF prior to the development of open reduction and internal fixation (ORIF) (Fig. 13). However, there were shortcomings to their use as well. There is increased surgical time in both placement and removal of the arch bars, the surgeon bares the risk of penetrating injury, there is a risk of damaging the periodontium, and proper oral hygiene becomes compromised (Qureshi et al. 2016). Therefore, in 1989, self-drilling IMF screws were introduced by Arthur and Berardo to help overcome these shortcomings (Fig. 14). They used self-tapping bone screws that were 2 millimeters in diameter. The mandibular screws were placed between the root apices and the mental

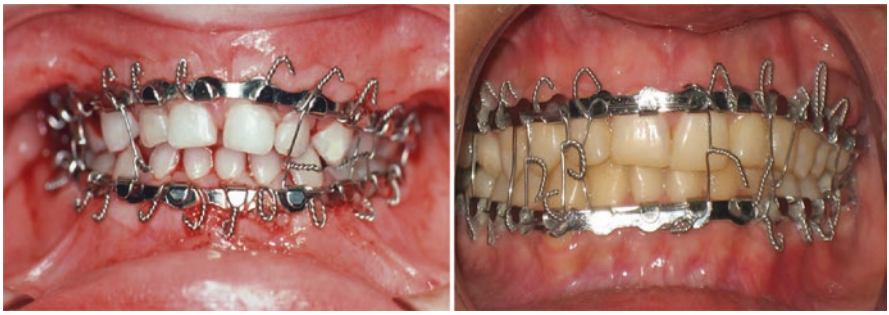

Fig. 13 Erich arch bars. (*UT Health San Antonio*)

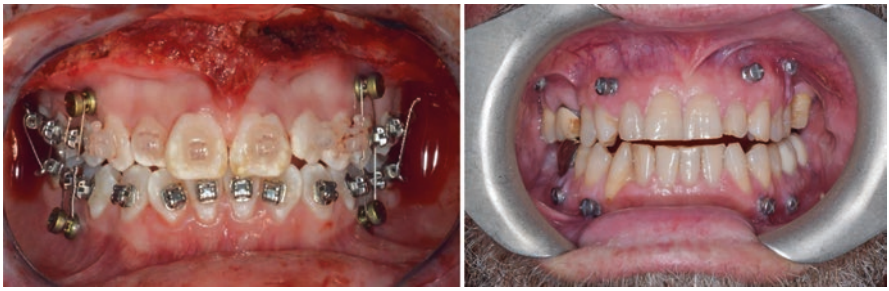

Fig. 14 IMF screws. (*UT Health San Antonio*)

foramen, whereas the maxillary screws were placed in the pyriform rim and zygomatic buttress areas (Qureshi et al. 2016). Some advantages of IMF screws were minimal use of hardware, decreased operation time, and no risk of needlestick injuries; however, there is still the risk of accidental root perforation (El-Anwar 2017; Qureshi et al. 2016). Ultimately, both Erich arch bars and IMF screws offer adequate temporary MMF intraoperatively to check occlusion (Qureshi et al. 2016).

9 Present Day

Currently, the most common treatment modality for mandible fractures is ORIF (Ellis and Miles 2007). In spite of this, closed reduction is still commonly used in some cases when surgery is not indicated. The location as well as the number and severity of fractures guides the anatomical approach and hardware that can be utilized. Research has also greatly expanded on the comparison of different techniques or armamentarium for treating mandible fractures. For instance, it is now known that the use of two miniplates results in more postoperative complications versus the use of one stronger plate for treatment of mandibular symphysis/body fractures (Ellis 2011).

Advances in plating osteosynthesis have also decreased the need for postoperative MMF (Ellis and Miles 2007). This is advantageous because it has been found that there are detrimental effects of mandibular immobilization on the masticatory apparatus (Ellis and Carlson 1989). Moreover, the ability to access fracture sites intraorally, or even endoscopically in some cases, has provided a significant improvement in aesthetic outcomes (Ellis and Miles 2007). Recently, resorbable polymer plates have been introduced as a management technique for mandibular fractures; however, they remain mostly used in non-load-bearing cranial and orbital regions (Hosein et al. 2013).

10 Conclusion

Despite the significant advances in management of mandible fractures, from the time of the ancient Egyptians to the present day, the goal of the surgeon of restoring form and function remains unchanged.

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