

Mandibular
distraction
osteogenesis
associated with pierre
robin sequence



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Pierre Robin Sequence commonly known as PRS, is one of the many syndromes associated with cleft palate. According to Hong and Kearns (2015), Pierre Robin described the sequence in 1934 with a list of characteristics including micrognathia, glossotosis, and sometimes cleft palate. In order to understand this sequence, knowing what these words mean is important. Micrognathia is a term that is used to describe an undersized jaw and glossotosis means an oversized tongue. Often times when neonates and children who experience these anomalies together or separately they will experience an airway obstruction due to the tongue covering the airway (Hong and Kearns, 2015). Severe upper airway obstruction secondary to Pierre Robin Sequence will demand immediate medical attention (Hong and Kearns, 2015). Individuals that require urgent medical attention can undergo a surgical procedure called Mandibular Distraction Osteogenesis. This paper will review the surgical procedure itself, what the surgeons look for before and after distraction, and some of the possible complications that could arise with this invasive procedure.

Neonates and children with Pierre Robin Sequence will often undergo a surgical procedure called Mandibular Distraction Osteogenesis (MDO). The surgery was introduced in 1992, and by 1998 it became a highly relied upon procedure in patients with Pierre Robin Sequence (Tsang, Adil, Scott, 2015). The procedure consists of lengthening the mandible to help alleviate the airway obstruction caused by the glossotosis (Tsang et al., 2015). MDO can be a very lengthy process taking up to six or ten weeks to complete the three phases. At present, there are no specific indicators or guidelines when

evaluating newborns for mandibular distraction osteogenesis (Tsang et al., 2015).

According to Tsang and colleagues, surgeons must use biased and unbiased opinions when determining procedure candidacy. The first thing that is looked for and the most pressing issue is the airway. If a neonate exhibits signs of acute airway obstruction, the airway must be urgently secured via endotracheal intubation or a tracheotomy (Tsang et al., 2015). For those who are not exhibiting airway distress, the other anomalies must be assessed with historical and physical examinations. Dysmorphic features, neurologic impairment and cardiopulmonary dysfunction should be noted as Pierre Robin Sequence can be associated with several other conditions (Tsang et al., 2015). When considering mandibular distraction osteogenesis, feeding habits must be heavily analyzed and detailed. A diligent assessment of reflux, swallowing dysfunctions, and a feeding evaluation can help determine procedure candidacy (Hong and Bezuhy, 2013). Children with poor reflux can have poor postoperative outcomes, so surgery is often deferred until the patient reaches two point five kilograms or five point five pounds.

There are two different types of hardware that are used to perform MDO, external and internal. During MDO the lower jaw bone is gradually lengthened, by cutting the smaller jaw bones and using the “ tension stress” principle (Hong and Bezuhy, 2013). MDO is composed of three phases: the first one is osteotomy and latency, the second one is distraction, and the third one is consolidation. In phase one cuts are made on the jaw and distractor devices are put into place spanning the jaw (Hong and Bezuhy, 2013). Latency is the time between the surgery and the beginning of <https://assignbuster.com/mandibular-distraction-osteogenesis-associated-with-pierre-robin-sequence/>

distraction. The time window for this can be anywhere from 24 hours to seven days. In phase two, the distractor, which has been connected to the mandible, can be turned once or twice daily (Hong, 2011). The preferred maximum length for distraction is 15 millimeters. In Phase three, new bone will regenerate to heal and become healthy bone with mechanical reinforcement. Phase 3, the consolidation phase, can take up to four to ten weeks to complete. During this time, surgeons will often obtain radiographs or computed tomography studies to assess the degree of bone formation prior to any removal of the distractors (Hong, 2011). For most children who are diagnosed with Pierre Robin Sequence, MDO can be a highly effective treatment. In conclusion, MDO helps clear airways and allows the child to grow up with the chance of living a normal healthy life.

As previously stated, MDO can be a very lengthy procedure, and it entails many different phases. The complexity of this procedure demands a team approach that includes: pediatric surgeons, neonatal intensive care specialist, otolaryngologists, pulmonologists, anesthesiologists, and radiologist (Meyers, Zei, and Denny, 2015). During MDO surgery, the surgeon looks for landmarks pre and post operation to determine if the procedure is going to be successful. In neonates the distraction begins on the first postoperative day ranging from one to two millimeters per day. During this time, the surgeon is looking for the readiness for intubation by measuring the relief of obstruction by the tongue base (Meyers et al., 2015). It is important to evaluate the mandible in order to determine if there is enough adequate space for osteotomy and hardware placement. This evaluation can be done by using a 3-D volume- rendered CT in which the

surgeon is looking for at least 17 millimeters between the antegonial notch of the neck of the mandible to the mandibular condyle (Meyers et al., 2015). When evaluating the mandible, surgeons also pay attention to the tooth follicles and inferior alveolar ridge because it can be damaged when they go to place the distractor pins.

It is important to evaluate the airway pre operation also using a 3-D CT to determine if there more compromises than usual found and if the procedure could improve the respiratory status (Meyers et al., 2015). After the surgery is performed the surgeon is assessing the success and healing of the operation. At the sixth week follow up, radiographs are taken to assess for consolidation when the hardware is placed or removed and anterior radiographs are taken for the assessment of mandibular osteotomy sites and positioning of the distraction hardware (Meyers et al., 2015). When looking at these radiographs the surgeons are making sure at least one thread from the pins or screws extends medial to the medial cortex of the mandible to obtain maximal support (Meyers et al., 2015). The healing process includes five stages: induction, inflammatory, reparative, hard callus and remodeling. (Meyers et al., 2015). Once these stages are complete the neonatal or child should exhibit normal features.

With any surgical procedure, there are potential complications that could arise because the human body can reject or not conform to what is trying to be performed. Complications that could arise within MDO could be minor surgical site infections and scaring or a few substantial complications including hardware failure, delayed union, nonunion, tooth bud injury (Meyers et al., 2015). The minor surgical infections or possible scaring is <https://assignbuster.com/mandibular-distraction-osteogenesis-associated-with-pierre-robin-sequence/>

from the external incisions of the pins that are placed in the neonates or child's face to help secure the hardware devices in place (Tsang et al., 2015). Hardware failure usually occurs from the pins of the external distractor or the screws of the internal distractor losing their attachment to the bone of the mandible but, it is said to just be bone structural insufficiency that causes this rather than hardware failure (Meyers et al., 2015). Hardware failure can occur bilaterally or unilaterally and it results in little to no movement of the mandible.

Another complication is delayed union and nonunion. Delayed union is the term used when the site has not undergone bony union by six months post-injury. Nonunion is described as the failure of fracture healing without further intervention. There are three different types of nonunion complications: hypertrophic, oligotrophic, and atrophic (Meyers et al., 2015). Hypertrophic nonunion is characterized by adequate blood supply but insufficient mechanical stability. Oligotrophic nonunion is characterized by insufficient contact between the osseous surfaces at the surgical site. Atrophic nonunion is characterized by little or no callus formation and restoration of bone at the surgical site. Tooth bud injuries can occur from the placement of the pins and screws in when attaching the distractor device because of the small space of the pediatric mandible the surgeon has to work with. When the placement of a pin in a tooth bud occurs it can cause dysplastic formation of the tooth (Meyers et al., 2015). Tooth bud injury can also occur from the placement of the bicortical K-wires used during the procedure (Tsang et al., 2015). There are other possible complications of this procedure that could come about but those are the most common reoccurring.

The individuals with Pierre Robin Sequence that require urgent medical attention can undergo a surgical procedure called Mandibular Distraction Osteogenesis to help alleviate the airway obstruction caused by the micrognathia, glossotosis, and possible cleft palate. Overall this procedure has been proven to be very effective and safe way to help neonates and children that suffer from Pierre Robin Sequence.

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