



OCEAN
SURGICAL Pty
Ltd

Surgical Orthodontics | Lower Jaw Distraction

MANDIBULAR RETROGNATHIA AND OSTEODISTRACTION

Orthognathic surgery is the art and science of creating proportion between the upper and lower jaws, in coordination with orthodontic alignment of teeth. Treatment is conducted conjointly by a specialist orthodontist and specialist oral and maxillofacial surgeon.

Jaw distraction is a relatively new technique in Oral and Maxillofacial surgery, and is set to revolutionise the management of mandibular retrognathia in adolescents. The under-growing lower jaw (which has been present throughout childhood), leads to a number of secondary dental and facial developmental problems; all of which have their major ramifications in the last few years of adolescent growth.

Firstly, and most obviously, the shortened lower jaw cannot accommodate all the adult teeth, and severe crowding becomes a prominent orthodontic treatment issue. By not coming into a normal biting relationship, some teeth over-erupt; and some never erupt at all. Front teeth may become "bucky" as the lower lip gets caught behind the upper incisors making them stick out (and more prone to injury). The lower front teeth over-erupt and can even cut into the palate (roof-of-mouth).

As the chin is so short, there is a reduction in normal facial height. There is a primary affect on lip continence, and many patients suffer from frank drooling. The inability for the teeth to meet makes eating and biting abnormal, and sometimes impossible. Many patients develop life-long jaw-joint clicking and later frank arthritis.

Mild cases of short jaw are classically treated with premolar or molar extractions, so that the orthodontist can "pull-back" the prominent upper front teeth. This style of dental treatment does nothing to correct for the under-developed lower jaw and usually results in a compromised facial developmental profile. A sloping facial profile is created that worsens the lack of chin projection.

Traditional orthognathic surgery aims to prevent orthodontic tooth extractions, and to correct for the shortened lower jaw after the completion of a formal orthodontic treatment course. Surgery follows orthodontic treatment, and occurs once growth has ceased. Treatment times and complexity are usually greater with this form of treatment, but results are usually excellent, with normalisation of facial profiles and occlusion.

New jaw-distraction techniques are relatively less complex operations, with fewer side-effects and are quicker to perform. Importantly they can be done at a much younger age, whilst growth is still occurring. The most important revolution of jaw distraction surgery is that surgery can precede braces, and prevent damaging compensatory jaw growth and over-eruption of teeth in the opposing normal jaw. Jaw distraction surgery (and surgery performed in-between teeth) pre-emptively creates spaces for later orthodontic alignment of crowded lower dental arches.

Most operations only last a couple of hours, and overall treatment can be completed over six weeks. Orthodontic braces normally follow, and usually can occur without the traditional removal of premolar or molar teeth. The braces close the gaps that distraction can cause, and allows for general straightening

of the teeth. The change in facial appearance can be dramatic, even over the short 6-8 week treatment periods demonstrated here.

If you are considering jaw distraction surgery as suitable for your child, it is important that your orthodontist is both familiar with this style of treatment, and with the surgeon performing the operation.

Treatment is carried out in a "team" atmosphere, with coordination of the activities of the patient, parent/carer, orthodontist and surgeon. Two operations are usually required (one to place the distractors, and one to remove them), and the actual distraction process is carried out at home with regular reviews both with the orthodontist and maxillofacial surgeon.

Surgery and anaesthesia is heavily Medicare subsidised, with surgical appliance and hospital costs provided by Medical/Hospital insurance. Patients with craniofacial abnormalities may be eligible for inclusion into the Cleft-Lip and Palate Scheme, with orthodontic treatment also subsidised by Medicare.

CASE 1. 12 YEAR OLD MALE WITH SEVERE MANDIBULAR RETROGNATHIA

This 12 year old boy had a family growth tendency of extremely short lower jaw. Because the jaw is so short, there is a prominence to the upper teeth, and a complete inability to chew as the back teeth do not meet.



Severe underset jaw characterised by prominence of upper teeth, and 'caught' lower lip. Correction over 8 weeks gives fullness to the lower face, and normalisation of lip posture as well as occlusion.



8 week treatment difference. Severe underbite and complete inability to chew or bite as no teeth contact in normal occlusion. Correction creates a stable and interdigitating occlusion, with the orthodontist able to place braces for a normal orthodontic treatment course.



The underset jaw characterised with prominence of the upper teeth, complete lip incompetence, and retruded profile and chin. Correction through distraction, allows for the lower jaw to 'catch up' and normal facial growth continues with normal jaw proportions.

Distraction of the jaw occurs between the 1st and 2nd molar teeth. The space created extends the lower jaw forward, as well as allowing for creation of an orthodontic space; used later to 'unbuckle' the lower teeth into a normal arch form.



Treatment sequence shown is:

1. Pre-operative view
2. Three months post-operative OPG
3. Nine months post-operative view (with closure of the dental gap using orthodontic brackets). Full distraction was ~10mm.

Surgery occurs between the back 1st and 2nd molars and literally "stretches" the jaw. Over 1 week the jaw assumes normal proportions and teeth interdigitate normally.

No complications from surgery occurred, adjacent teeth were healthy, and importantly there was no residual lip numbness. Swelling and discomfort from surgery was minimal and short lasting.

CASE 2. 13 YEAR OLD MALE WITH MODERATE MANDIBULAR RETROGNATHIA

As the retrognathic lower jaw is so set back, the lower lip is unable to cover and protect the upper front teeth. Such prominence leads to increased rates of knocking and chipping. Moderate underset jaw is characterised by a short chin height, and catching of the lower lip behind the upper front teeth.

Lack of lip protection to the front upper teeth leads to increased rates of dental injury and tooth chipping.



After surgery photo (on right) shows natural lip continence, and longer lower chin height. Difference between photos is 8 weeks.



Separation of the lower 1st and 2nd molars occurs with distraction. Time difference seen here is 6 weeks.

Normal bone consolidates in the distraction gap, with normal chewing forces achieved at -8 weeks from initiation of the distraction process.



Before and after photos showing effect of lower jaw distraction on the general relationship between the upper and lower teeth.

Distraction distance is ~8mm, and results in normalisation of the bite into a skeletal Class I type occlusion.

Braces can be placed at any time, but the orthodontist has elected for braces to be placed in 12 months time, allowing for further natural general facial growth to occur once jaw distraction has ended.

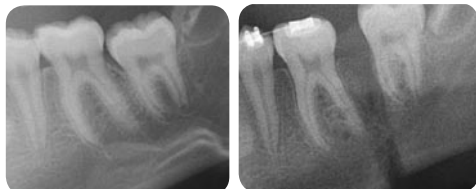
Potential complications from this form of surgery include persisting lip numbness, surgical compromise of adjacent teeth, scarring, pain and swelling. In all cases of distraction thus far, no such complications have occurred. You should discuss all surgical risks prior to embarking on any surgical course.

CASE 3. 14 YEAR OLD MALE WITH MODERATE MANDIBULAR RETROGNATHIA AND IMPACTED LOWER 2nd MOLARS

The retruded lower jaw is aesthetically displeasing. Persisting with the growth problem can lead to social teasing and isolation during adolescence. Distraction surgery is the most conservative and enhancing of jaw proportioning operations and importantly occurs before growth has ceased.



Moderate underset chin is corrected with normalisation of lower jaw length by a bilateral forward distraction distance of ~9mm. Note the improvement in lip alignment, and increased prominence and height of chin, as well as alignment of the front teeth into a normal biting relationship. Time difference between before and after photos is 6 weeks.



Impaction of the lower 2nd molar is relieved with surgical jaw distraction occurring between the 1st and 2nd molars. The time difference is ~6 weeks, with normal bone continuing to consolidate at the distraction site, and normal eruption of 2nd molar has already occurred. The orthodontist will use the distraction space to align and unbuckle the forward crowded arch of teeth.

Following surgery to remove the distractors (or shortly just before), your orthodontist will normally apply orthodontic braces for a normal course of intra-arch tooth alignment.



Braces are placed just prior to removal of distractors, and a normal period of orthodontic treatment follows for 18-24 months. Time difference seen here is 12 weeks.

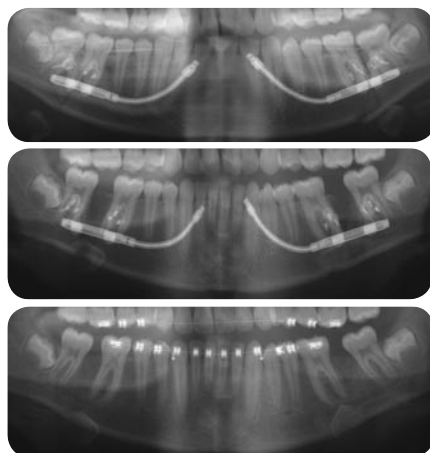


Final orthodontic result once braces are removed 12 months following initial surgery.

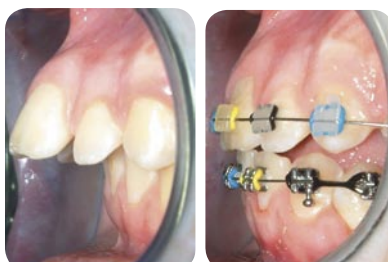
CASE 4. 13 YEAR OLD MALE WITH MODERATELY RETRUCED MANDIBLE



Before and after photos showing definitive over-bite, with lack of lip protection of upper front teeth on smiling. Total correction occurs through surgery. Time difference is 8 weeks.



X-ray series showing placement of distractors, with full lengthening of 8mm achieved after 8 days. Consolidation of new bone occurs over the following 6 weeks. Final x-ray shows bone appearance at 8 week point. Notice the full mineralization of new bone that has occurred at the distraction sites between the 1st and 2nd lower molars.



Before and after photos showing incisor relationship. Small open bites, incisor imbrications, and over-eruptions are imminently treatable with a much reduced course of orthodontic treatment.

IMPORTANT POINTS ON DISTRACTION SURGERY

1. Distraction is amongst the most conservative, preserving and enhancing of facial surgical procedures available. It aims to avoid routine orthodontic extraction of teeth, and to maximally enhance the potential growth of the child's under-developed facial structures.

2. Early (adolescent) treatment for the retruded mandible may not be an option for all patients. For some, traditional jaw correction surgery may be more appropriate at a later (early adult) age. It is important to talk with the surgeon to know which style of operation is more appropriate for you or your child.

3. The pattern and style of distraction therapy varies from patient to patient. Surgical planning varies according to individual anatomy, patient age, and style of orthodontic treatment to be performed.

4. Distraction treatment spans vary from 6-12 weeks, and there are normally two operations; one to place the distractors, and one to remove them (usually 6-8 weeks after placement).

5. Distraction is normally carried out at home, is normally very comfortable, and lasts up to 2 weeks. One-on-one support is provided to parents or carers during the distraction period, and regular review appointments are maintained with the surgeon. There may be several x-rays to assess surgical progress through the distraction period.

6. Patients with cranio-facial disorders may be eligible for placement onto the Cleft-Lip and Palate Scheme to help with dental aspects of care (including orthodontics). Distraction surgery and distractor appliance costs are heavily subsidised by Medicare, and your medical/hospital insurer.

7. Only your Maxillofacial Surgeon and Specialist Orthodontist are trained to coordinate your overall dental and facial growth treatments. Distraction surgery is specialist level only, and not all surgical or orthodontic practitioners are able to provide a distraction service.

8. With a referral by your medical GP (and when referring to this newsletter), your initial consultation and baseline x-ray (OPG) are bulk-billed by the Maxillofacial surgeon.

9. There are risks and complications with all types of surgery, and you should carefully discuss all such risks with your surgeon.

DISTRACTOR APPLIANCES



Left and right distractor appliances. Based on the Ilizarov technique of lengthening short legs and other long bones, the intra-oral distractor uses an internal screw system allowing unilateral or bilateral jaw lengthening of up to 1mm/day. Distraction occurs near wholly within the mouth, with minimal or no post-operative scarring or otherwise late-evidence of surgery.