



**OCEAN**  
SURGICAL Pty  
Ltd

## Surgical Orthodontics | Mandibular Advancement Surgery

Orthognathic surgery is the specialist surgical science of proportioning the jaws, and involves close collaboration between specialist Orthodontists and Maxillofacial Surgeons. Together their objective is to align both the teeth and jaws so as to achieve balanced, functional and beautiful faces, smiles and bites.

### THE RETRUDED MANDIBLE AND ORTHOGNATHIC ADVANCEMENT SURGERY

A retruded mandible arises where lower jaw growth lags behind upper jaw growth. As jaws carry the teeth, a retruded mandible leads to a 'skeletal-malocclusion'. This is characterised by a primary inability to properly chew, with secondary problems related to jaw-joint health, inability for lips to meet, over-developmental eruption or collapse of front teeth, problems of mandibular facial symmetry, and retrusion of the lower facial profile.

With severe retrusion, snoring can become a problem with adult development of obstructive sleep apnoea (OSA).

Classic orthodontic treatment (braces) can only align the teeth within each jaw. Normally the jaws have grown together in a proportional way so that teeth naturally occlude or come together as a "Class I" bite. In a retruded mandible (Class II bite), the lower teeth are set well back, and once teeth are aligned, they do not naturally "occlude". Classic orthodontic treatment requires extracting upper premolar or molar teeth, to create back-space in order to "pull back" the seemingly prominent upper front teeth. Such extractions and orthodontic treatment may achieve a Class I bite, but it does nothing to correct for the retruded mandible, and can in fact develop or accentuate an abnormal sloping facial profile.

As an alternative, the orthodontist may provide arch alignment in anticipation of future orthognathic jaw surgery. By this method, premolar tooth extractions can be avoided, and teeth are straightened in a way that anticipates the future (surgically corrected) normal jaw position; whilst ignoring the current abnormal jaw relationships.

From the time jaw growth has ceased (from ~16-18 years), a mandibular operation can be performed to instantly correct for the undergrown lower jaw, and thus achieve a perfect Class I occlusion with a normally proportioned facial profile.

Orthognathic surgery is complex, and usually involving the following steps...

1. A formal course of orthodontic treatment to generally align the teeth within the arches. This can last for 12-24 months.

2. The patient will present to the surgeon for a consent process, and for a general estimation of surgical costs. These surgical, hospital and anaesthetist costs are in addition to your orthodontic treatment costs. In most cases, private medical insurance and Medicare can substantially subsidise the costs of surgical and hospital care. Dental insurance can help cover the costs of your orthodontist.

3. Once your orthodontist considers surgery can commence, he will place heavy arch wires, with 'cleats'. These must be present for at least 2 weeks before impressions are taken.

4. Your surgeon or orthodontist will take dental impressions, a 'face-bow' and wax-bite record. The surgeon will use these, in coordination with the orthodontist and a maxillofacial technician, to plan your surgery and provide a surgical bite wafer. This is called 'model-surgery' and can cost ~\$500-600 (these are technician costs only). This cost is separate to surgery costs.

5. Surgery is always provided in a private hospital, and takes approximately 3 hours. The surgery is to both sides of your lower jaw, and almost entirely takes place within the mouth. The surgery is very similar to impacted lower wisdom tooth removal surgery. The surgical wafer is used as a guide for your new jaw position. There are 1-2 nights of overnight hospital stay. Titanium fixation plates are used to fixate your jaw into the new bite position. There are secondary costs of the hospital stay and of the anaesthetist, and all costs are subsidised through either Medicare or your Medical insurer.

6. The following office day, the surgeon will make an OPG (x-ray) assessment of the jaws. If x-ray examination determines that surgery has not been absolutely precise, jaw surgery may be immediately repeated.

7. At the same review appointment, the client is placed into elastics, which keeps the bite closed and firmly locked. This process uses the 'cleats' the orthodontist has previously placed. Elastics allow for bone healing to occur without jaw movement. This 'elastic IMF' can last from 1-4 weeks.

8. At 10 days your sutures are removed. At ~4 weeks the surgical bite wafer is also removed. A further review appointment is made when the braces are finally removed by the orthodontist (~3-6 months after surgery). The surgeon recommends removal of jaw fixation plates at between 6-12 months after orthognathic surgery, but these may be left in permanently.

### CASE 1. 35 YEAR OLD FEMALE WITH COMPLAINT OF BILATERAL JAW JOINT PAIN RELATED TO RETRUDED MANDIBLE

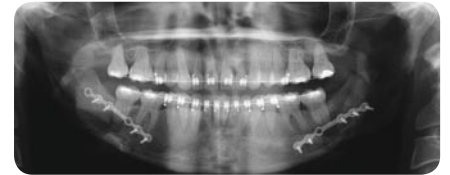
Because of the set back position of the underset lower jaw, people will attempt to posture their mandible forward in order to get a proper bite, or to improve their profile appearance. This chronic behaviour, developed when young, usually presents as an ache or frank pain in the over stretched adult jaw joints, and can lead to frank osteoarthritis or internal derangement of the joints.



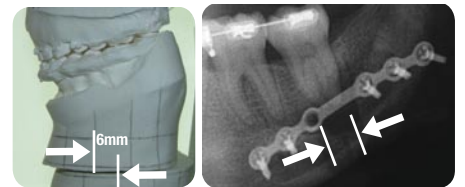
Pre-surgical, post-surgical and post-orthodontic profiles. Sequence demonstrates changes to upper lip fullness, forward projection of chin, and enhancement of lower lip prominence into an overall aesthetically balanced smile and profile. Jaw advancement surgery has eliminated any ongoing jaw joint symptoms.



Left-oblique photos showing ~6mm mandible advancement of retruded mandible. Photos demonstrate pre-surgical, post-surgical and post-orthodontic occlusions.



Post-operative OPG showing bilateral telescope-like advancement of the mandible; with internal fixation using titanium plates. Fixation devices may be removed later in a separate and minimal 1/2 hr general anaesthetic procedure.



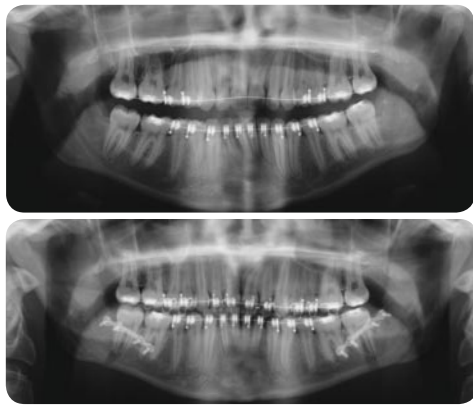
Vertical lines on pre-surgery plaster models demonstrate ~6mm advancement, evidenced by separation of vertical separation lines on post-surgical OPG.

Jaw surgery can occur at any age, and is dependent on both general health, and on the health of teeth and jaw joints. If damage to teeth from crowding (periodontitis or excessive tooth decay), or to jaw joints (from osteo-arthritis or chronic internal derangement) is too great, orthodontics and jaw surgery may not achieve the same results as surgery performed at a younger age.

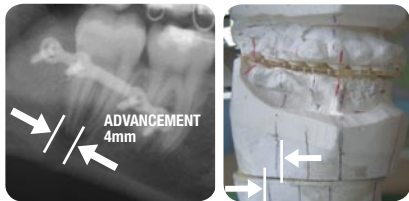
### CASE 2. 16 YEAR OLD FEMALE WITH MILD MANDIBULAR RETRUSION CHARACTERISED BY NATURAL INABILITY OF THE LIPS TO MEET (LIP INCOMPETENCE)



Small under-bite, with mandible underset by 4mm (mild Class II). Bite corrected with 4mm advancement mandibular surgery, and classic non-extraction orthodontic therapy. Treatment time is 24 months.

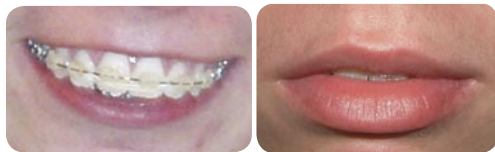


Pre- and post-operative OPG views, showing approximately 4mm advancement, secured with bilateral mandibular titanium plates



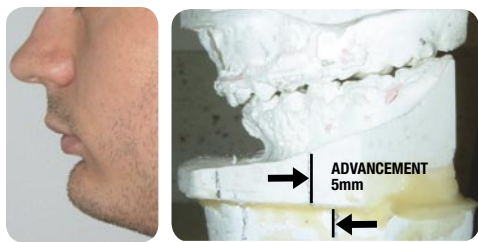
Close up of right mandibular osteotomy site, showing advancement of 4mm as predicted by model surgery (shown by step in vertical lines on lower cast)

In females especially, the lower lip is a cosmetic concern, as it is caught behind the upper teeth, and becomes 'hidden'. Mandibular advancement surgery has the advantage of reducing double chins (excessive anterior neck roll), releasing the lower lip, and in producing a height accentuation to the lower chin. The combination of all these effects is to proportion and balance the aesthetic features of the lower face.



Upper lip surgery provides fullness and vermilion height. Separate mandible advancement of the retruded mandible provides fuller lower lip roll. The lips now meet and are competent in natural lip posture.

### CASE 3. 23 YEAR OLD MALE WITH MODERATE MANDIBULAR RETRUSION AND SECONDARY COLLAPSE OF ANTERIOR MAXILLARY ARCH AND SECONDARY SNORING



Before and after profiles showing correction of retruded lower jaw, and post-surgical normalisation in projection in both chin and lower lip. Pre-surgical cast model indicates the intended amount of forward jaw movement required to properly inter-align the arches. Vertical lines indicate movement required.

Snoring is a common feature of the retruded mandible and can lead to features of obstructive sleep apnoea. Jaw advancement almost always can correct the condition by advancing the posterior tongue from the back of the throat/pharynx.

Without orthodontics, crowded teeth are more prone to decay and periodontal disease. Whilst orthodontics can align teeth within an arch, surgery is required to bring the lower jaw forward so that the final orthodontic result is even, and the bite functional.



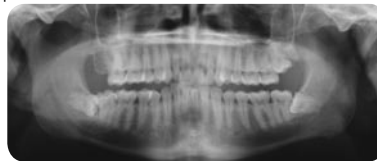
Before and after photographs showing frontal view of occlusion and smile. Notice the evenness of the upper teeth, corrected with orthodontic arch alignment, and the full show of the lower teeth, corrected with advancement jaw surgery. Time difference is 18 months.

With mandibular retrusion, the potentially pronounced upper teeth may become set back, exacerbating a complex malocclusion on an already compromised skeletal jaw disproportion.

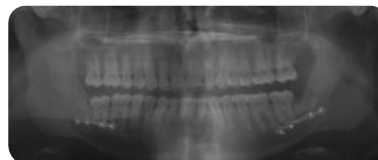


Before and after photographs on right lateral view of occlusion and smile. With this view, the extent of maxillary incisor correction can be clearly seen, with advancement jaw surgery clearly improving the show and relationship of the lower teeth.

As lower jaw surgery is required in the approximate region of where the wisdom teeth (3rd molars) lie, their removal is often a pre-requisite to both orthodontics and surgery. The relatively benign experience of having wisdom teeth removed is very similar to later jaw advancement surgery, and gives a good indication as to the amount of post surgical discomfort that can be expected.



Pre-treatment OPG x-ray, showing impacted wisdom teeth. Wisdom teeth removal is required prior to both orthodontic management and later jaw surgery. Surgery for removing wisdom teeth has minimal post-operative effects. The experience of wisdom tooth surgery closely approximates the post-operative course for later mandibular advancement surgery.



Post-treatment OPG x-ray, showing impacted wisdom teeth having been removed. Bone plates are now present in the same regions of the jaw, and indicate where the jaw was bilaterally lengthened ~5mm.



X-ray series showing close up of left lower wisdom tooth area. Jaw surgery 'telescopes' the mandible forward in the region of previous wisdom tooth surgery. The middle x-ray shows the 'telescope' gap, which 6 months later is now completely healed and filled in.

There are risks of advancement surgery which includes persisting lip and chin numbness, and the potential also for relapse of the amount of advancement achieved. Relapse is prevented with the use of titanium plates, and which are kept in place for upwards of 6-12 months, and then removed. Numbness of the chin and lip is usually due to local swelling or stretching of the sensory nerves contained within the mandible. As swelling decreases, sensation usually returns, but if numbness occurs, full recovery is not as predictable in the older patient.

## IMPORTANT POINTS ON MANDIBULAR ORTHOGNATHIC (ADVANCEMENT) SURGERY

1. Orthognathic surgery to advance the retruded (short) mandible usually follows on from a formal orthodontic treatment period. Surgery occurs at an age where further growth of the mandible is deemed to have ceased.
2. Treatment aims to avoid older styles of orthodontic treatment where the prominence of the upper teeth is reduced by setting back these teeth into spaces created by extractions of premolar teeth. Such older treatment processes can be aesthetically disastrous, with an abnormal affect on the adults facial profile.
3. An under-developed lower jaw has some medical manifestations beyond simply an inability of the teeth to meet. Snoring is a common complaint, as the tongue is also set back, and can easily occlude the airway whilst asleep. Snoring can sometimes indicate the presence of obstructive sleep apnoea. Sleep apnoea is a serious adult complaint, and which can lead to high blood pressure, heart disease, and also stroke. If you have sleep apnoea, surgical correction is coordinated with a sleep disorders physician as well as your orthodontist.
4. The natural and full aesthetic potential of your child's facial profile, as well as facial symmetry is maximally enhanced by combined orthodontic and orthognathic treatment.
5. Alone, orthognathic surgery aims to enhance lip profiles, provide lip fullness, make the lower face symmetrical, give projection to the chin, and provide normalisation of the occlusion into ideal Class I occlusal relationships.
6. Orthognathic surgery is only conducted by Maxillofacial Surgeons, in combination with orthodontic treatment provided by Orthodontists. Together these specialists work as a team to maximally enhance the patients face, smile and occlusion.
7. Orthognathic surgery normally (but not always) avoids the necessity for pre-orthodontic premolar or 1st molar tooth extractions.
8. Not all facial proportions or skeletal malocclusions are characterised purely by a retruded mandible. Depending on your age, skeletal development, and a range of factors, different jaw operations (or a combination of them) may be more appropriate for full correction of all occlusal relationships and facial proportions. Carefully discuss all aspects of your treatment with a specialist orthodontist or maxillofacial surgeon before embarking on any course of treatment.
9. Orthognathic surgery will normally require impressions and construction of a special surgical bite wafer; provided by the surgeon. Heavy arch bars and orthodontic cleats are placed pre-surgically by your orthodontist. These preparatory treatments may be followed by post surgical inter-maxillary elastics (elastic IMF).
10. Orthognathic mandibular surgery is localised to the lower wisdom teeth areas, and surgery is roughly similar in terms of technique and post-operative course to wisdom teeth removal. Complications of wisdom tooth surgery and orthognathic surgery are also roughly similar, but differ in relation to chance of advancement relapse, the effects of advancement on existing jaw joint disease and symptoms, and effects on surrounding local sensory nerves (such as which supply the lower lip, chin and tongue).
11. There are risks and complications with all types of surgery, and you should carefully discuss all such appropriate considerations with your surgeon.