



## **Patient Information Guide to Inion CMF (Cranio-maxillofacial) Surgery**

Surgical procedures and surgery can be an intimidating for many patients and this is why we hope to offer a good insight into the type of injury, some possible solutions and how Inion® implants and technologies can help.

It is always extremely important for you to find out as many details as possible about your problem, the available methods of treatment for that condition, and any particular surgical method your physician may recommend for you.

### **What is cranio maxillofacial surgery?**

Cranio-maxillofacial (CMF) surgery encompasses the treatment of the face, jaws and skull, including trauma and the correction of facial skeletal deformity.

### **Facial Anatomy:**

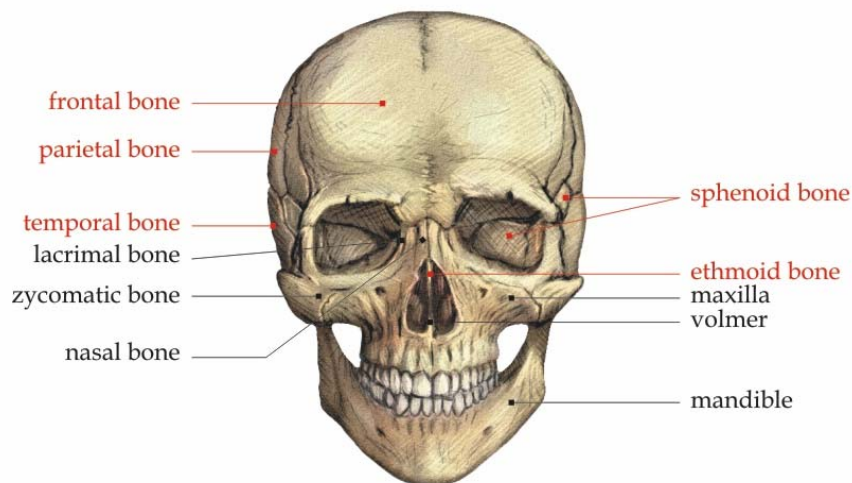
To best understand your surgery, it is important that you learn as much as possible about the problem you are experiencing and the treatment options that are available.

The human cranium and the facial bones are the foundation for the soft tissues of the face and head. Thus, much of the visible appearance of the human face depends upon the shapes and qualities of these bones.

The cranium is that part of the skull that holds and protects the brain in a large cavity, called the cranial vault. Eight plate-like bones form the human cranium by fitting together at joints called sutures. The most important of these cranial bones for the appearance of the face is the frontal bone, which underlies the top of the face above the eyeballs.

The human skull also includes 14 facial bones that form the lower front of the skull and provide the framework for most of the face that is important to psychological research.

These 22 skull bones form other, smaller cavities besides the cranial vault, including those for the eyes, the internal ear, the nose, and the mouth. The important facial bones include the jaw bone or mandible, the maxilla or upper jaw, the zygomatic or cheek bone, and the nasal bone.



## **Facial Fractures:**

### **What is a fracture?**

A fracture means a broken bone. Whether you have a complete or a partial fracture, you have a broken bone. A bone may be completely fractured or partially fractured in any number of ways (cross-wise, in the middle, in several pieces).

Facial fractures occur for a variety of reasons including assault, falls, motor vehicle accident and sports injury, e.g. contact between players (head, fist, elbow); contact with equipment (balls, skateboard, handlebars); or contact with environment, obstacles, or playing surface (wrestling mat, gymnastic equipment, goalposts, trees).

Millions of people sustain trauma to the head and face resulting in complex fractures which, if not correctly diagnosed and treated, may cause permanent functional and cosmetic deformities

### **Diagnosing fractures**

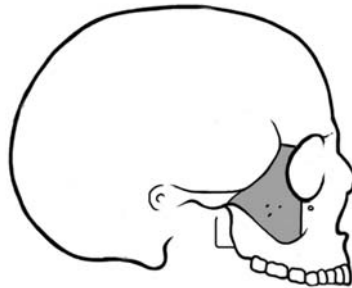
While most facial injuries are minor, the potential for serious damage exists. A doctor will need to examine these injuries and must rapidly assess the patient in a consistent and methodical manner, allowing for prompt diagnosis and appropriate treatment

Usually, you will know immediately if you've broken a bone. You may hear a snap or cracking sound. The area around the fracture will be tender and swollen. Doctors usually use an X-ray or CT scans to verify the diagnosis.

## Fracture types:

The most common facial fractures are:

- Simple nasal fractures are the most common of all facial fractures.
- Fracture of the cheekbone (zygomatic bone). The cheekbone, which forms part of the eye socket, helps to protect the eyeball and supports it from below. It is also connected to the side of the nose and upper jaw.



- Mandible (lower jaw) fractures. This can involve teeth and the condyle (jaw joint)



## What are the treatment options for fractures?

The fracture needs to be held in the correct position while the bone is healing. In most cases this requires fixing the bones using metal or biodegradable (implants that are not permanently in the body as they dissolve) plates and screws (called internal fixation).

This fixation is usually done under general anaesthetic i.e. you will be asleep during the operation.

Once you are asleep the bones will be put back into the correct position. This involves making a cut, either in the gums inside the mouth, in the hairline or along a scar or skin crease. The bones are then put back together in their correct position and held in place with small plates and screws.

Some fractures of the cheekbone produce a break in the bony floor of the eye socket and occasionally the eyeball needs to be supported even after the bones are put back into their correct position. To provide this support, material such as thin sheets of plastic, bone grafted from other areas of your body or biodegradable plastic mesh is put into the floor of your eye socket through an incision below your eyelid (as described above).

During the operation it can be necessary to place wires or metal braces around your teeth so that elastic bands can be attached to them to guide your bite into the correct position after surgery.

It may be necessary to remove damaged or decayed teeth at the site of the fracture during surgery. Also if the fracture is difficult or complicated to repair it is sometimes necessary to make a cut on the outside of the mouth through the skin.

## **Craniomaxillofacial Reconstruction**

Craniomaxillofacial reconstruction is a term used to describe the repositioning of bones of the skull and/or face to correct deformity, either congenital or acquired. Other terms used are orthognathic surgery and craniofacial surgery

### **What is Orthognathic surgery?**

This literally means “Surgery to create straight jaws” and involves cutting the jaws and moving them into a new position.

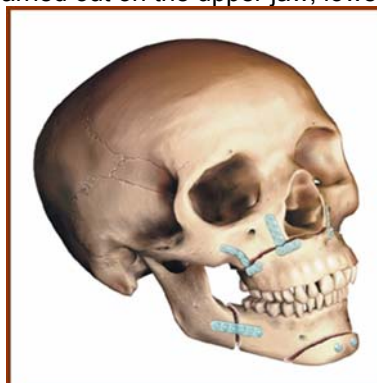
Some of the most common reasons for orthognathic surgery are:

- Overbites, where the teeth of the top jaw significantly overlap those of the lower jaw and the chin is receded
- Underbites, where the teeth of the lower jaw overlap those in the upper jaw and the chin juts out too far
- Open bite, where either the front or back teeth don't meet while biting
- Vertical discrepancies, when there is too much or too little exposure of the upper front teeth

These deformities are usually caused by excessive or under development of the facial bones. The corrective surgery is however not purely cosmetic as the deformity is just the visible sign of a more significant functional problem. Misaligned jaws cause difficulty biting and chewing food caused by malocclusion (teeth do not meet correctly).. They also can be painful and can contribute to speech difficulties and breathing problems like sleep apnea.

### **What happens during the operation?**

The operation is usually done through the inside of your mouth so that you do not have any visible scars on the skin of your face. A cut is made through the gum above or below your teeth to gain access to the bone. The bone is then cut with a small saw to allow it to be broken in a controlled manner. It is then moved into its new position and held in place with small metal or biodegradable (implants that are not permanently in the body as they dissolve) plates and screws. This operation can be carried out on the upper jaw, lower jaw or both jaws.



During the operation it is often necessary to place wires or metal braces around your teeth so that elastic bands can be attached to them and guide your bite into the correct position after surgery.



### **What is Craniofacial Surgery?**

Craniofacial surgery is surgery to the cranium to correct congenital and early post natal deformities and is most commonly indicated where fusion of the infant's skull is premature and constricts subsequent growth (craniosynostosis).

To allow for the proper growth of the brain and skull early in life, the bones of an infant's skull are not joined at birth and the sutures (gaps between the bones) act as a type of expansion joint. Once growth is complete the cranial bones fuse. If this fusion happens prematurely, skull growth is restricted and, as a result, the head will take on an abnormal shape. Normally the only way to correct these changes are with a surgical procedure. The ideal time to perform these procedures is the first year of life but subsequent corrections may be required at maturity.

### **What does the operation involve?**

A cut is made in the scalp and the bone is then cut with a small saw to allow it to be broken in a controlled manner. It is then moved into its new position and held in place with small with metal or biodegradable (implants that are not permanently in the body as they dissolve) plates and screws.

Biodegradable plates and screws are often preferred as they do not interfere with bone growth, subsequent operations or imaging (X-rays or CT scans).





### Advancement in treatment options:

Since the 1980s, titanium plates and screws became the most commonly used fixation devices in cranio-maxillofacial surgery. However titanium is not without its problems. Particular concerns have centered on the restriction to bone growth and implants migrating through the cranium in children. Also adult patients complain about feeling the metal implants, particularly in cold weather or through thin skin.

Inion launched its **Compact Plating System(Inion CPS<sup>®</sup>)** in 2001 for use in the following clinical areas:

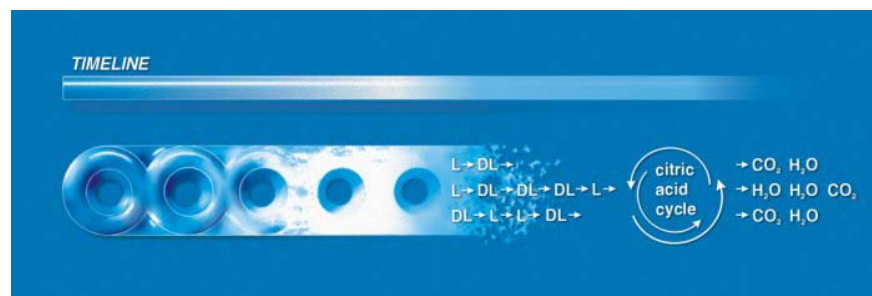
- Cranio Maxillofacial trauma (resulting from e.g. assaults, falls or vehicle accidents)
- Orthognathic surgery (straightening of the jaws to create an even bite)
- Craniofacial surgery (to correct congenital and developmental deformities)

Inion CPS<sup>®</sup> is the only biodegradable CMF system with applications for all areas of the facial skeleton, and comprises a range of biodegradable plates, screws and custom instruments for use in children and adults.



### What are biodegradable implants?

Medical implants that are biodegradable break down gradually by a series of natural processes in the body over a period of time. Biodegradable materials are also known as (bio)resorbable, and (bio)absorbable. These implants are metabolized by the body into carbon dioxide and water which is then exhaled and excreted.





### **What are the advantages of biodegradable implants over metal implants?**

Biodegradable implants have many advantages over metal implants as they hold the bone firmly while it heals and then gradually disappear. This means the patient benefits from:

- No need for another operation to remove a metal implant, which lessens the risk to the patient of another surgery and in some, cases another anaesthetic.
- Implants do not remain in the body long term so patients will not have to be concerned about feeling the implant through the skin or cold metal causing an 'aching' feeling in cold weather.
- Implants do not interfere with X-rays, scans or airport security checks as they are not made of metal.
- Do not interfere with bone growth
- No risk of metal allergies being caused by metal implants.

### **What are the Inion® Biodegradable Implants made from?**

All Inion OTPS™ implants are based on Inion Optima™ polymer blends (more plastic like, not metal) and have excellent handling properties, and strength and degradation characteristics that support a more natural healing process.

The biocompatibility of the materials has been well documented and the same polymers have been clinically used for more than 30 years in biodegradable sutures (dissolving stitches) and orthopaedic fixation devices.

### **What is Inion Optima™?**

Inion Optima™ materials are made by the blending of highly pure rigid and elastic polymers. The result of blending the polymers is a unique family of materials called Inion Optima™ that possess extraordinary combinations of strength, toughness (malleability) and biodegradation ability.

