

SURGERY OF THE MANDIBULAR JOINT

Charles Tomes Lecture delivered at the Royal College of Surgeons of England

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by

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IT IS A great honour to read the Charles Tomes Lecture and the subject of my paper is "Surgery of the Mandibular Joint".

In this country, increasing numbers of patients are referred to dental out-patient clinics with diseases or derangement of the mandibular joint. To diagnose the pathology present and to treat the symptoms require a deep knowledge, not only of the functional anatomy and the physiology of the temporal mandibular part of the joint, but also of the teeth and their supporting structures.

The mandible articulates with the skull, not only with the articulating surface of the condyles in the glenoid fossae, but also by the mandibular teeth occluding with the maxillary teeth. Disturbance in one of the three articulations can produce symptoms in one or both of the other component parts. It is increasing recognition of the mandibular articulation as a three-component joint, one of which is the teeth, that has directed lesions of the temporo-mandibular component of the articulation to the dental surgeon for treatment.

John Hunter states: "There is one disease of the jaws which seems in reality to have no connection with the teeth, but of which the teeth are generally suspected to be the cause. . . . I have known cases of this kind where all the teeth on the affected side of the jaw have been drawn out, and the pain has continued in the jaw; in others it has had a different effect, the sensation of pain has become more diffused and has at last attacked the corresponding side of the tongue."

He goes on to describe several remedies that have failed, but concludes, a little hopefully perhaps, "Sea bathing has been in some cases of singular service".

This was perhaps the earliest written work on mandibular joint arthrosis, but in 1934 Costen published *A syndrome of Ear, and Sinus symptoms dependent on disturbed function of the Mandibular Joint*, and although Costen's syndrome is generally disproved, there is no doubt his paper brought symptomatology to the attention of clinical investigators and led to a great deal of work and published results on "Mandibular Joint Disturbances".

At the Queen Victoria Hospital, East Grinstead, post-graduate students from all parts of the world attend the hospital for varying periods of time, and simplicity of teaching is desirable. There are many operative procedures that can be performed on the mandibular joint, but there are three basic operations that can suffice for pathology or derangement where surgery is indicated. The three operations are:

1. Condylectomy.
2. Arthroplasty.
3. Condylotomy.

1. *Condylectomy* is indicated in cases of arthrosis or arthritis when pathological changes can be demonstrated on X-ray in the bony components of the joint; such changes are the classical radiological signs of osteo-arthritis, osteophytic or resorptive bone changes. Condylectomy is also indicated in cases of hypertrophy, osteoma or other tumours of the condyle.

The surgical approach to the mandibular joint should give adequate access without damaging the facial nerve, and the incision is made either above or below the level of the main trunk of the facial nerve, the surface landmark of which is the attachment of the lobe of the ear.

The sub-mandibular incision for a condylar operation would only be used for the exceptional case, such as a very large tumour of the condyle. Normally the incision is in the fold in front of the ear, from the upper aspect of the zygomatic arch to the attachment of the lobe of the ear, and an extension of the incision is carried in the hair line forward to facilitate access without strong retraction. Heavy retraction in close proximity to the facial nerve can produce paresis.

The case I illustrate is of a young girl aged 17, who had noticed a progressive deformity of the face over a period of two years.

On examination there was a definite facial asymmetry with the chin displaced to the right. The maxilla appeared to be normal.

Intra-orally there was a cross bite with a lingual inclination of the molar teeth and on the left side there was a vertical elongation of the maxillary alveolar bone to bring the maxillary teeth into articulation. The jaw movement was normal. X-rays showed an asymmetrically developed jaw with excessive growth in length of the left side, including the mandibular condyle, and a diagnosis was made of left-sided unilateral condylar hyperplasia.

Under endotracheal anaesthesia and controlled hypotension, the line of incision as described is marked in Bonney's blue and the flap raised and held by a stitch.

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The condyle is approached from the posterior aspect, taking care not to cut into the cartilage of the external auditory canal, and the capsule of the joint is opened (Fig. 1).

The osteotomy is performed with a chisel and the external pterygoid muscle is removed from the neck of the condyle which is then extracted.

A corrugated rubber drain is inserted into the dead space and brought out behind the ear and the tissues are repaired in layers (Fig. 2).

The post-auricular drain remains *in situ* for 48 hours and enables a complete repair of the visible anterior scar to be made. Intermaxillary fixation is achieved by means of a single pair of eyelet wires, the jaw



Fig. 1. Exposure of the condylar head from the posterior aspect.

being wired to the maxilla in a centric position and immobilization maintained for seven days. Post-operatively there is minimal scar cosmetic deformity and the mandible is in a centric occlusal position and the movement is normal without any training appliance. Later the bite will be rehabilitated by conservative dentistry.

The condylar head was sectioned and compared with a normal condyle of a 17-year-old and the findings were consistent with a simple condylar hyperplasia.

2. *Arthroplasty.* Inability to open the mouth may be due to spasm or fibrosis in the elevator muscles of the mandible, or it may be a sequel to the injection of a sclerosing fluid into the joint cavity. Such cases can be

treated by manipulation and subsequent disciplined exercising; but where there is bony or fibrous ankylosis, surgery must be carried out. Ankylosis is due to a fibrous or bony union of the joint surfaces; it may be unilateral or bilateral and may be caused by birth trauma, suppurative arthritis, rheumatoid arthritis, osteomyelitis or comminuted fractures of the condylar head.

In ankylosis of the mandibular joint in a child, surgical mobilization of the joint should be carried out as soon as possible. The growth centre is



Fig. 2. The repaired incision and the post-auricular drain.

destroyed, but mobilization will encourage nutrition and dental care with a subsequent mitigation of the deformity.

Many operations have been described to mobilize an ankylosed joint. Barton of Philadelphia in 1826 carried out an ostectomy at the neck of the condyle, and Esmarck in 1851 described the removal of a wedge-shaped piece of bone from the ascending ramus of the mandible.

Subsequent to that many operations have been described, the basis of them being the removal of the mass of bone uniting the mandible to the base of the skull, and the interposition of muscle, cartilage dermis or

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fascia to prevent osteogenesis recurring. But experience has shown that, even with disciplined exercising of the mandible for a long period after operation, ankylosis tends to recur in a great many of the cases.

More recently the removal of the mass of bone and the interposition of acrylic, vitallium, tantalum foil, or chrome cobalt, have been advocated.

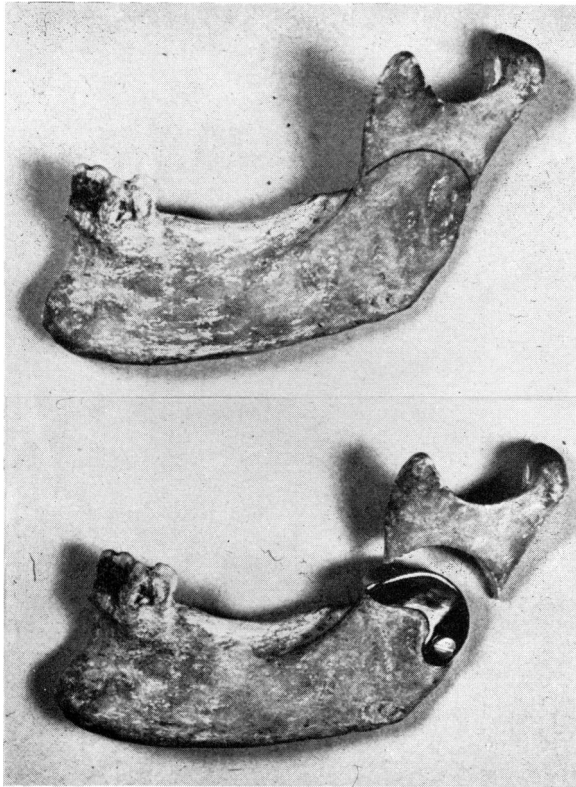


Fig. 3. Cover of chrome cobalt made to cover the upper surface of the lower part of the new joint.

Most of these operations are designed to create a joint in the condylar region and the use of artificial condyles made of vitallium was advocated by Foged nearly 20 years ago (1942). Husted and others carry out a two-stage operation, in which the condylar mass is removed, the jaw mobilized, an impression is taken of the sectioned aspect of the ascending ramus of the mandible and from this impression an acrylic condylar head is processed which is fixed to the mandible at a subsequent operation.

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The operation developed at East Grinstead for ankylosis is basically the retention of the condylar mass and the creation of a new joint below it.

True lateral and postero-anterior X-rays of the facial bones are taken and from these X-rays a model mandible is made in plaster endeavouring to reproduce the shape and dimensions of the ascending ramus to be operated upon.

On this plaster model, just above the level where the inferior dental nerve enters the mandible, a half-circle, convexity upwards, is marked on the bone and the ramus is sectioned along this line. A roof or cover of chrome cobalt is made to cover the upper surface of the lower part. This

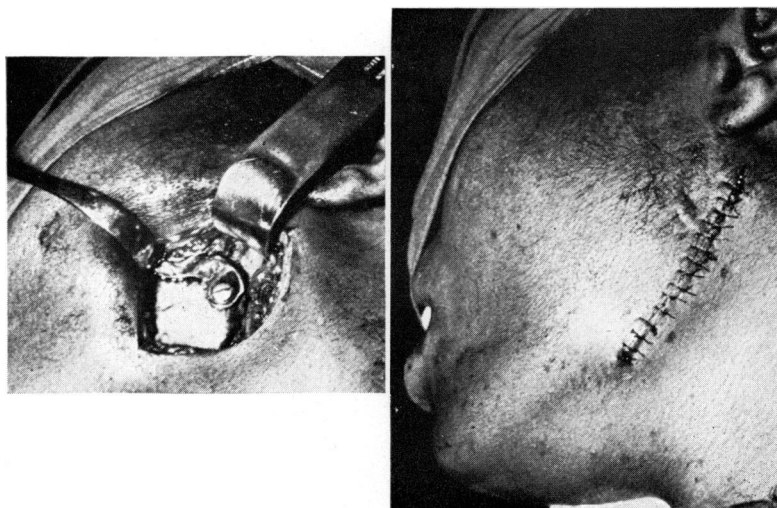


Fig. 4. The implant screwed into position and the tissues repaired.

cover projects inwards beyond the inner surface of the mandible and is fixed by a single screw at the posterior edge of the ascending ramus (Fig. 3).

The case illustrated is of a coloured woman aged 37 years.

Twelve years ago, the lower left wisdom tooth was removed. This was followed by pain and swelling over a period of ten months with subsequent inability to open the mouth. As a result, though a happy woman, she had avoided social contacts. On examination, the lady was not suffering from malnutrition. The jaw opening was minimal, and X-rays showed a mass of bone occupying the condylar region. The chrome cobalt cover was made as shown in the illustration and, under endotracheal anaesthesia with controlled hypotension, a submandibular incision is made inferior to

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the facial nerve and posterior to the facial artery. Dissection is carried down to the mandible and the masseter muscle elevated to expose the external surface of the ascending ramus of the jaw. The internal pterygoid muscle is not disturbed. Using a prepared template, the appropriate circle is marked on the ramus at the pre-determined level and, using a dental engine and burs, the osteotomy is performed.

The jaw is then mobilized, any rough edges smoothed down in the line of bone section, and the chrome cobalt implant placed in position (Fig. 4).

If the preliminary work has been carried out precisely, then the implant should fit accurately. It is fixed in position with a single bone screw and

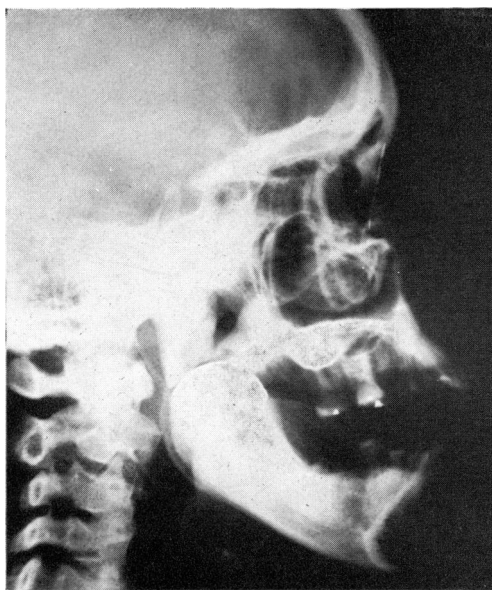


Fig. 5. Post-operative X-rays showing position of the implant and mouth opening.

the tissues are repaired in layers; no dead space is left and no drain is necessary.

Ten days after the operation, although slight swelling is still present, the opening is good and easily accomplished with freedom from pain. The post-operative X-rays show the position of the implant, and the mouth opening is adequate (Fig. 5).

This operation, I think, has many advantages to commend it. The surgical approach is not difficult, as no attempt is made to remove the condylar mass of the bone. The simplicity in design of the chrome cobalt implant enables a surgical technician to fabricate it in cooperation

with the surgeon without difficulty. In the cases done by this method, subsequent limitation of mandibular movement has not recurred and with a cooperative patient there is no need to fix or supply oral exercisers. Several of these operative procedures have been done bilaterally—it leaves the patient with a hinged movement of the mandible only, but function has been good.

3. *Condylotomy*. Joint derangements are extremely common, the patient presents with a history of a click and/or pain in the preauricular

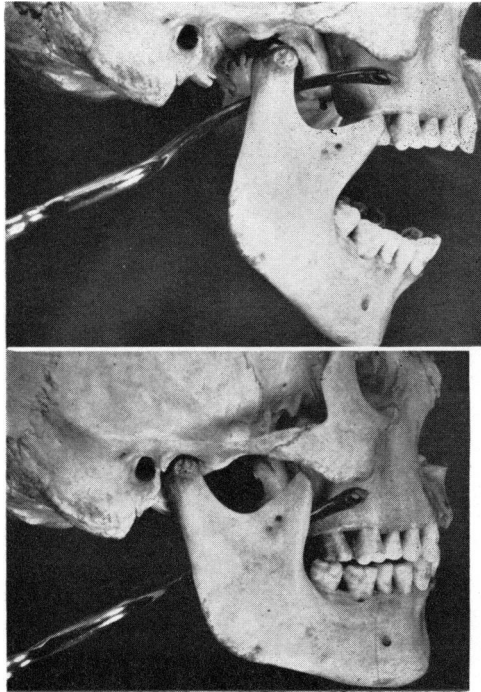


Fig. 6. Path of director in relation to the maxilla and mandible.

region. Hankey in a previous Tomes Lecture in 1954 analysed 150 cases and showed that in the majority of cases the ætiology of the arthrosis was occlusal disharmony and that correction of the occlusal abnormality would eliminate the symptoms in the majority of cases.

It is generally accepted that retroposition of the condylar head is the ætiology of the symptoms and, if untreated, the condylar head will not occupy its normal position in relation to the meniscus, but in protrusive movement will push the meniscus in front of it producing for the patient a feeling of obstruction in the joint.

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Occlusal rehabilitation aims to bring the retroposed condylar head more forward to establish the normal relationship between the head of the condyle and the meniscus, and is a successful treatment of the arthrosis in most cases.

Surgical procedures used for joint arthrosis are many. Hydrocortisone injections are useful in the acute joint, especially if effusion is present, but the effect is a transient one, unless the ætiology of the trauma is ascertained and dealt with.

Sclectrosing solutions are injected into the joint in an endeavour to produce fibrosis and stabilization. Schultz in 1937 advised the use of an aqueous solution of sodium psylliate for the purpose, but though it has a

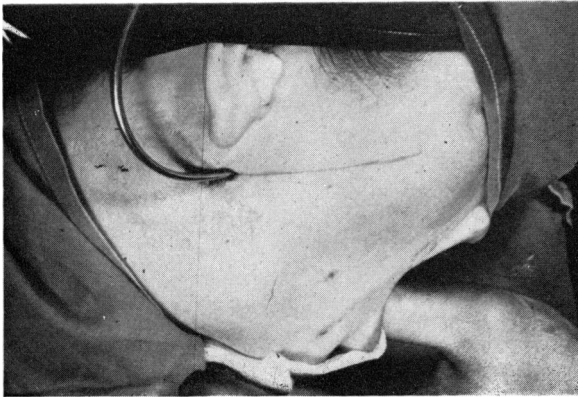


Fig. 7. Director being inserted underneath the mandible.

use in hypermobility of the joint, it has never seemed a logical treatment for arthrosis.

Meniscectomy as a treatment of joint derangement was first described by Lanz in 1909, and 30 years later Sir Cecil Wakeley enthusiastically recommended meniscectomy as a surgical cure of joint derangement. Many other authors have advocated this procedure and few have found fault with it. At East Grinstead the problem has been approached in a different way. Oral rehabilitation by means of inlays and crowns is a long and expensive treatment. A prosthesis worn permanently to modify the bite must promote caries and subsequent premature loss of teeth. Could one accept the occlusal imbalance and modify the position of the condylar head?

The "post-fracture syndrome" (Thoma, 1958) has always occupied oral surgical literature as one of the causes of arthrosis.

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It states: "Fractures through the neck of the condyle with or without dislocation and fractures of the ramus or mandibular body when not properly reduced can produce traumatic changes in the joint". In fractures of the mandibular body, the trauma is the occlusal disharmony resulting from an improper reduction. But I have had considerable experience of fractures through the neck of the condyle and I have not seen a case of arthrosis resulting from such a fracture. Also in a few cases of fractured neck of condyle, where a history was obtainable of previous joint derangement, that derangement was cured as a result of the accident. It therefore seemed logical to fracture the neck of the condyle and allow the external pterygoid muscle to pull the condylar head forward.

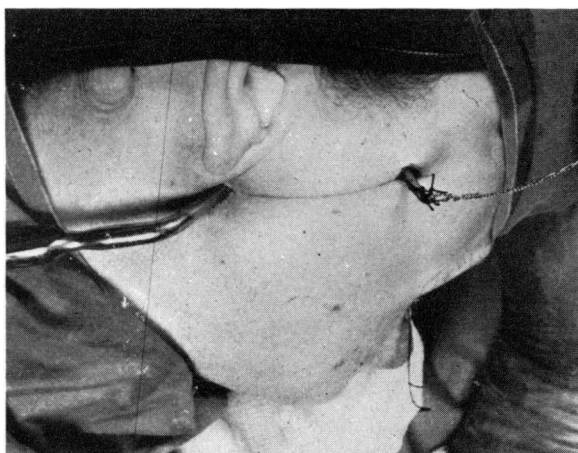


Fig. 8. Director emerging below the malar and Gigli saw attached.

MacGregor in a previous Tomes Lecture (1955) demonstrated that union of the condylar fracture is always to be expected and therefore, by moving the condyle forward by surgery, a new muscle balance will be created between the external pterygoid on the operated side and the other muscles involved in mastication.

It was decided to use a closed approach for the condylotomy. Osteotomy of the ascending ramus of the mandible is simply carried out by passing a Gigli saw with the aid of a suitable director and sawing through the bone. Using the same approach, if the mouth is opened instead of being closed while the director is being passed, then the director will come through the sigmoid notch and the Gigli saw can be brought into an appropriate cutting position on the neck of the condyle (Fig. 6).

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In fact many condylotomies have been carried out in error when the surgical intention has been to saw through the ascending ramus of the mandible below the sigmoid notch.

The case I illustrate is that of a middle-aged woman with a typical history of right-sided mandibular joint arthrosis. She had been treated by a complete repertory of conservative methods without avail, and it was decided to accept her occlusal pattern and alter the position of her right condyle.

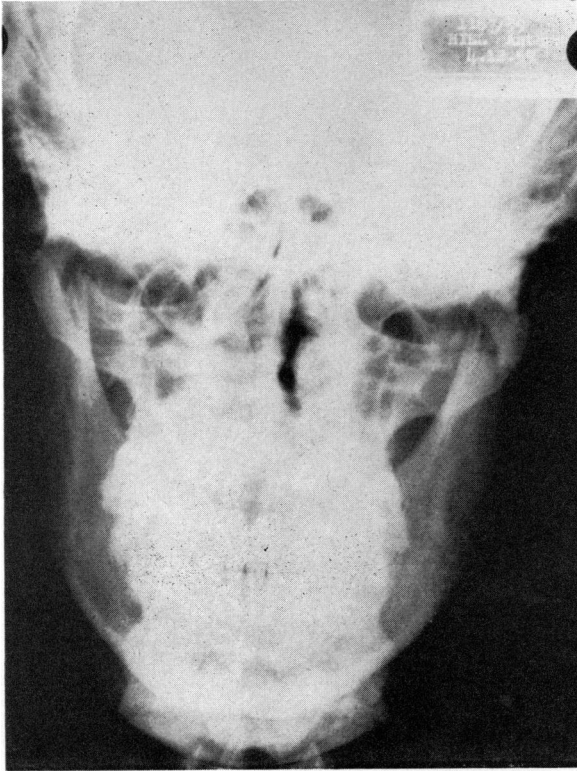


Fig. 9. P.A. X-ray showing position of condylar head.

Under endotracheal anaesthesia, and controlled hypotension, but not using a relaxant as it is essential to know that the facial nerve is able to respond if stimulated, a line is drawn across the face. The landmarks used are from a finger's breadth below the attachment of the lobe of the ear to just below the inferior orbital margin. This line is used as a visual guide while passing the director. The mouth is held in the open position and a stab incision is made down to the ascending ramus of the mandible,

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The director is then inserted (Fig. 7). The point of the director is held continually on the bone and a path is felt, not forced, until the director emerges through the sigmoid notch, when a second incision is made to allow the point of the director to emerge through the skin. The Gigli saw is then attached to the director and drawn back (Fig. 8). The saw is carefully used to avoid laceration and extension of the small incisions, but is under strong tension.



Fig. 10. Lateral oblique X-ray showing position of condylar head.

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A few cuts with the saw, while the assistant holds the jaw against the pull, and the condyle neck will fracture. The external periosteum of the condylar neck is not cut through; this prevents too much displacement of the condylar head and the saw will not cut into the soft tissues in relation to the facial nerve. The Gigli saw is cut and removed, then the incisions are sutured; usually a single suture will be sufficient for each cut.

Intermaxillary fixation is achieved by using a pair of eyelet wires, the teeth being held in the occlusal, not in the rest, position, and a pressure bandage is applied for 24 hours. In the edentulous patient no intermaxillary fixation is used, but the dentures are immediately inserted after operation.

The X-rays show the postoperative position of the condylar head (Figs. 9 and 10). The intermaxillary fixation is maintained for five days and is then removed, and the patient encouraged to use the jaw normally.

Over 40 patients have had condylotomies carried out for arthrosis and we have reviewed 21 of them.

Number reviewed	..	..	..	..	..	..	..	21
(a) Males	..	..	..	..	..	..	..	5
(b) Females	..	..	..	..	..	..	..	16
Site (a)	..	..	..	..	..	..	Right	15
(b)	..	..	..	..	..	..	Left	8
Onset of Symptoms								
(a)	..	..	..	..	..	..	Acute	13
(b)	..	..	..	..	..	..	Gradual	8
<i>Precipitating Trauma</i>								
(a) Chewing	..	..	..	..	..	..	..	5
(b) Following extractions	..	..	..	..	..	..	..	4
(c) Yawning	..	..	..	..	..	..	..	1
(d) During sleep	..	..	..	..	..	..	..	1
(e) No history of trauma	..	..	..	..	..	..	..	10
<i>Symptomology</i>								
(a) Pain—clicking locking	..	..	..	..	..	..	..	18
(d) Ache and morning stiffness	..	..	..	..	..	..	..	2
(c) Recurrent dislocation	..	..	..	..	..	..	..	1
Duration of symptoms from six months to seven years. Average three years.								
<i>Previous treatments:</i>								
(a) Dentures	..	..	..	..	..	..	..	7
(b) Bite raising appliances	..	..	..	..	..	..	..	18
(c) Occlusal grinding	..	..	..	..	..	..	..	7
(d) Short wave diathermy	..	..	..	..	..	..	..	7
(e) Extractions	..	..	..	..	..	..	..	8
(f) Intermaxillary fixation	..	..	..	..	..	..	..	3
(g) Sclerosing of joints	..	..	..	..	..	..	..	2
(h) Orthodontic treatment	..	..	..	..	..	..	..	1
(i) Manipulation under G.A.	1
Result of previous treatment	Nil improvement	

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Loss of Molar Support

Complete	Bilateral	5
No loss		6
Full dentures		4
Partial dentures		6

Excursion of affected Condyle

Limited		14
Free		4
Excessive		2

Results of operation

Up to 3 months—		
(a) Complete relief		6
(b) Clinical improvement		9
(c) Worse		1
3 months to 3 years—		
(a) Complete relief		6
(b) Continued to improve		8
(c) Deteriorated		Nil

Condylotomy has been used as an operative procedure to cure mandibular joint arthrosis when conservative methods of treatment have failed. In established cases when a permanent bite splint is necessary: when leaving out the splint leads to a recurrence of symptomatology, then I think a condylotomy would be preferable to premature loss of teeth through caries.

It is a simple operation to perform. The hazards are minimal. The stay in hospital is not long, an average of five days, and the two small scars on the face are not a cosmetic disfigurement.

We have only had one patient whose symptoms became worse after a condylotomy, and I am certain that improvement in this case will duly take place when he achieves his discharge from the Armed Forces. It would be fair to say if surgical interference is contemplated on a mandibular joint for arthrosis then, of all operations, condylotomy, even if it fails to improve the condition, will not leave the patient any worse off.

Mr. President, Ladies, and Gentlemen, I have described to you the three basic operations that are used at the Queen Victoria Hospital, East Grinstead, on the mandibular joint. I thank my colleagues at the Queen Victoria Hospital, East Grinstead, for their great help, not only in the treatment of the patients, but also in the preparation of this paper.

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