DE LA CAFFINIÈRE ARTHROPLASTY FOR BASAL THUMB JOINT OSTEOARTHRITIS

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We performed 20 de la Caffinière trapeziometacarpal arthroplasties for osteoarthritis occurring only at this joint and reviewed all patients after periods of up to ten years. Eighteen arthroplasties were satisfactory postoperatively, although all 20 patients had a satisfactory range of motion and only one experienced pain after surgery such that it impeded normal function. Failure occurred in two patients and was due to over-reaming of the trapezium during surgery and a traumatic dislocation. A radiolucency between the prosthesis and bone was observed in one arthroplasty, although this patient was asymptomatic.

We recommend arthroplasty using the de la Caffinière prosthesis as a satisfactory method of treatment for the osteoarthritic trapeziometacarpal joint.

For maximal hand function the thumb should combine strength, stability and a pain-free range of motion. Its contribution to hand function is approximately 40% (Burton 1973) and the forces transmitted through the trapeziometacarpal joint are 10 to 15 times greater than those of power pinch (Cooney and Chao 1977). In the hand, the trapeziometacarpal joint is second only to the distal interphalangeal joints as the most common site of degenerative disease. Osteoarthritis of this joint produces symptoms ranging from minor discomfort to severe pain and disability. Painful osteoarthritis, when it has failed to respond to conservative measures such as alteration of the activity pattern, splinting, thenar muscle exercises, anti-inflammatory drugs or local steroid injection, has been treated by many surgical procedures (Thompson 1986; Burton 1987; Herndon 1987; Wolock, Moore and Weiland 1989). For pain relief arthrodesis has been recommended as successful (Müller 1949; Eaton and Littler 1969; Carroll and Hill 1973; Kvarnes and Reikerås 1985) but at the expense of limiting movement. Excision of the trapezium relieves pain (Gervis 1949) but causes loss of power (Gervis 1973).

Interposition of soft tissue, after excision of the trapezium, has been said to produce a stable, pain-free thumb (Froimson 1970; Dell, Brushart and Smith 1978; Weilby 1988) and the use of an implant as a spacer has

also been described (Swanson 1972; Kessler 1973; Ashworth et al 1977; Pellegrini and Burton 1986). Satisfactory pain relief was reported but problems included fracture of the prosthesis and silicone synovitis.

Excision of the base of the thumb metacarpal, or partial excision of the trapezium, followed by replacement with a cemented prosthesis have both been recommended (de la Caffinière 1974; de la Caffinière and Aucouturier 1979; Braun 1985; de la Caffinière and Rothe 1985; Cooney, Linscheid and Askew 1987). While some success has been reported, there were problems with loosening and component failure. When successful, arthroplasty affords the best solution in that it gives pain relief, stability and a satisfactory range of motion.

We report our experience with the de la Caffinière total joint arthroplasty applied to a selected group of patients with trapeziometacarpal degeneration, chronic subluxation and crepitus.

PATIENTS AND METHODS

We performed de la Caffinière trapeziometacarpal arthroplasty (Fig. 1) on 20 hands in 17 patients (13 women, four men) at Musgrave Park Hospital, Belfast during the period 1980 to 1990. The right thumb was operated on in 13 patients and the left in seven. In the three patients who had bilateral arthroplasties, the operations were not performed in one session. The dominant hand (right) was operated on in six patients.

All patients had pain and stiffness before operation, and clinical examination showed crepitus, dorsolateral subluxation and a positive axial compression (grind) test (Table I). The diagnosis of grade II trapeziometacarpal osteoarthritis (Burton 1973) was confirmed by radiography (Table I, Fig. 2). All patients had been unsuccessful

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The de la Caffinière prosthesis.

Fig. 1

Fig. 2

The Burton grade II trapeziometacarpal osteoarthritis.

Fig. 3

Operative field photograph of prosthesis articulated in situ.

Table I. Classification of trapeziometacarpal arthritis (after Burton 1973)

Grade	Description
Stage I	Ligamentous laxity, hypermobile joint
Stage II	Trapeziometacarpal degeneration, chronic subluxation and crepitus
Stage III	Pan-trapezial degeneration
Stage IV	Stage II or III plus thumb metacarpophalangeal degeneration

fully treated before surgery by alteration of their pattern of activity and local injections of steroid.

Nineteen of the operations were performed by one surgeon (JWC). The operative technique was similar to that described by de la Caffinière (Figs 3 and 4). Postoperative management was by immobilisation for ten days in a dorsal plaster slab with a thumb ring, followed by gentle mobilisation.

All patients were assessed on 4/12/90 and three were

Satisfactory postoperative radiographic appearance of the prosthesis.

Fig. 4

further reviewed on 4/10/91. They all completed a questionnaire on pain, dexterity, and compliance. Pain was assessed by the patient as either not present, painful but not limiting normal function, or pain prohibiting normal function. Dexterity was assessed as either the

ability to manipulate a key in a lock, the ability to unbutton a shirt or blouse or the ability to perform fine-movement tasks. (For the male, the manipulation of screws and bolts; for the female, sewing tasks.) The patients were also asked: Given your experience of this type of hand surgery would you describe the result as good, fair or poor? We measured the range of movement of both thumbs in abduction, flexion and extension. Power-grip and pinch-grip measurements were performed using a Jamar hydraulic hand dynamometer and a Jamar hydraulic pinch gauge (Camp Ltd, Hampshire, England). Radiographs were taken of all patients at follow-up.

RESULTS

The mean age of the patients at operation was 57.25 years (42 to 70). The mean period of follow-up was 64.2 months (8 to 120). There were 16 pain-free arthroplasties and three that were painful without limitation of normal function. Only one arthroplasty was painful to the extent that function was prohibited. Fifteen patients could handle keys, 19 could manage buttons, and 18 could perform fine movements. The mean ranges of movement for the operated thumb were: abduction 39°, flexion 8.25° and extension 31°.

Radiographic assessment showed one case of collapse of the trapezium, one dislocation and one component-bone interface radiolucency in the trapezium. The dislocation was longstanding and pain-free. The patient recalled the injury which had caused the dislocation and stated that the thumb had been uncomfortable for only a few days afterwards. It is of interest to note that his power grip was the highest recorded in our series. Collapse of the trapezium with loosening of the implant occurred in one patient in whom there was trapezial perforation during operation caused by over-reaming. This patient experienced pain which prohibited normal function (Fig. 5).

DISCUSSION

The ideal operation for osteoarthritis of the trapeziometacarpal joint is that which will produce a pain-free, stable, mobile and powerful thumb. Pain relief following de la Caffinière arthroplasty was excellent: only one patient experienced pain severe enough to limit normal function; this was due to trapezial collapse. The range of movement and the strength (power and pinch grip) of the thumb were good when compared with the opposite thumb, as was reported in another series (de la Caffinière and Rothe 1985). Almost all the patients were enthusiastic about the results of the operation.

The two failures were due to trapezial collapse and to dislocation. Over-reaming of the trapezium is a hazard and resulted, in one patient, in an unacceptable outcome which will require revision. This potential complication

must be guarded against when reaming the trapezium. The dislocation was due to grossly excessive force being applied to the prosthesis. One patient had loosening, as evidenced by a prosthesis-bone interface radiolucency, but did not experience pain such as to inhibit normal function. This agrees with the findings of Braun (1985) who had one patient in his series in whom the trapezial implant was loose but who had a strong and mobile thumb. Radiolucency at the prosthesis-bone interface was also described by Cooney et al (1987) in 32% of Mayo arthroplasties although the symptomatic loosening rate was 19%. De la Caffinière and Rothe (1985) reported a loosening rate after ten years of 14% compared with our five-year rate of 5%. Heterotopic bone formation was reported as a problem by Cooney et al (1987) but we did not encounter this complication.

Fig. 5

Trapezial collapse; a complication of over-reaming.

Joint arthroplasty by the method of de la Caffinière is a satisfactory treatment for osteoarthritis of the trapeziometacarpal joint. We endorse the use of the pre-operative assessment criteria of Burton (1973) for the selection of patients suitable for the procedure.

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