The incidence of reoperation after temporomandibular joint arthroscopic surgery: A retrospective study of 450 consecutive joints

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Purpose. The purpose of this study was to investigate the incidence of reoperation after temporomandibular joint arthroscopic surgery in 315 consecutive patients (488 joints).

Study design. The clinical data and operative reports of all patients who underwent arthroscopic procedures from 1995 to 2000 were reviewed retrospectively. Patients had a preoperative clinical and panoramic radiographic evaluation. Most of the patients had disk displacement without reduction. In the remaining patients, the intra-articular pathologic conditions ranged from disk displacement with reduction to degenerative joint disease. The outcome assessment was based on reduction in pain, improvement in vertical dimension of mouth opening, and mandibular excursions. The same surgical team performed all arthroscopic procedures. Before surgery, all patients received at least 3 to 6 months of nonsurgical therapy consisting of anti-inflammatory medications, muscle relaxants, splint therapy, physiotherapy, exercise, moist heat, cold laser, ultrasound, and soft diet or a combination thereof. Patients were monitored postoperatively for as long as 5 years.

Results. Results showed that approximately 20% of those patients who had temporomandibular joint arthroscopic surgery underwent further temporomandibular joint procedures ranging from repeat arthroscopic surgery to open-joint arthrotomy.

Conclusion. Temporomandibular joint surgical arthroscopy is an appropriate therapeutic modality for patients with temporomandibular joint internal derangements, with reoperation required for only 20% of patients.

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Temporomandibular disorder is a collective term that has been defined as a group of conditions involving the temporomandibular joint, muscles of mastication, and associated structures. These disorders are relatively common, affecting at least 30% of the population.[1] This group of disorders can be severe enough to influence the day-to-day function of affected individuals and produce symptoms ranging from mild discomfort to substantial functional disability. The difficulty in treating patients with temporomandibular disorders stems from its multifactorial causation, which includes a biophysiopathologic component in addition to a psychological and a social one. In addition, these disorders can be further subclassified into those with a muscular origin or those restricted to the intra-articular apparatus of the temporomandibular joint or a combination thereof. The subjective presentation of patients with temporomandibular disorders can range from limited function secondary to increased pain levels, such as the reduced ability to chew hard food, to limited mouth-opening, and limitations of the excursive movements of the joint. These findings may be the result of intra-articular adhesions that may form as a result of disk surface friction and lack of effective lubrication precipitated by trauma, intracapsular bleeding, and effusion that result from microtrauma or a macrotraumatic event. Objectively, classifications of intra-articular disease have been described by Wilkes,[2] who classified internal derangements into different stages—ranging from normal articular surfaces to those with severe osseous degenerative changes. Imaging modalities—including panoramic radiography, arthrography, computed tomography, and magnetic resonance imaging—have ensured better diagnoses and correlation with the objective clinical findings.[3]

The treatment options for patients with temporo-

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mandibular disorders can range from conservative to surgical modalities.[4] Nonsurgical therapy may consist of antiinflammatory medications, muscle relaxants, splint therapy, physiotherapy, exercise, moist heat, cold laser, ultrasound, and soft diet or a combination thereof. Surgical therapy may include minimally invasive procedures such as arthroscopy or a variety of open-joint procedures. Before the advent of temporomandibular joint arthroscopic surgery, many patients who did not improve with conservative treatment underwent open-joint arthrotomy predicated on the severity of internal derangement or degenerative joint disease and their level of comfort.[5]

Since the introduction of arthroscopic surgery of the temporomandibular joint,[6] many publications have documented beneficial results with low morbidity.[7-15] Arthroscopy has the distinct advantage of direct visualization of the temporomandibular joint and fulfills not only a therapeutic role, but a diagnostic one as well.[12,13] It also allows lysis and lavage procedures under direct vision, as well as guided steroid injections. Operative arthroscopy of the temporomandibular joint has been reported to have favorable outcomes ranging from 60% to 90% depending on the type of internal derangement.[16-21] The purpose of this article was to determine the incidence of reoperation by analyzing data from 488 joints in 315 consecutive patients who underwent temporomandibular joint arthroscopic surgery.

METHOD

Operative records of 315 consecutive patients (488 consecutive joints with internal derangement) who underwent surgical arthroscopy between 1995 and 2000 were reviewed. On the basis of selection criteria, 21 patients with 38 temporomandibular joints were excluded because they had previous arthrotomies or arthroscopies. Therefore, the total number of patients included in this study was 294, with a total of 450 temporomandibular joints (Table I). This sample included 265 females and 29 males. The ages ranged from 14 to 67 years, with a mean of 36.4 years (Table I).

All patients received a panorex examination preoperatively, and selected patients received additional diagnostic images taken by means of arthrography, magnetic resonance imaging, or computed tomography. All patients had persistent painful temporomandibular joint symptoms after at least 3 to 6 months of conservative therapy consisting of anti-inflammatory medications, muscle relaxants, splint therapy, physiotherapy, exercise, moist heat, cold laser, ultrasound, and soft, nonchewy diet or a combination thereof. The following parameters were documented: age, sex, preoperative and postoperative pain on the Visual Analogue Scale, lateral and protrusive excursions, arthroscopic diagnosis, follow-up period, and incidence of arthroscopic reoperation in patients who had additional arthroscopic or open-joint procedures. The maximal opening was measured at each visit by using a 1-mm grade ruler. Inclusion criteria included all patients who underwent operative arthroscopy of the temporomandibular joint. Exclusion criteria included all patients who had previous arthroscopic procedures of the temporomandibular joint or those who had previous temporomandibular joint open surgery. The same 2 surgeons performed all the surgical procedures. Immediately after surgery, patients were started on a regular regimen of physiotherapy and adjunctive active home jaw exercises. The patients were followed up postoperatively for up to 5 years. Analysis of variance was used to perform statistical analyses.

Table I. Patient data summary

Subjects
Patients (n = 294)
Joints (n = 450)
Age (y)
Average 36.4 ± 8.3
Range 14-67
Sex
Male 29
Female 265

ARTHROSCOPIC SURGERY

All patients underwent double portal operative arthroscopy that consisted of adhesiolysis; lavage and manipulation; debridement of the superior joint space; and, where indicated, abrasion arthroplasty, partial synovectomy, or lateral capsular release, or all three. Success of the procedure was defined as at least 30% reduction in pain and a similar increase in mandibular range of motion.

RESULTS

Because 21 patients (38 joints) were excluded on the basis of having undergone previous surgical procedures, the records of 294 patients (450 joints) who underwent temporomandibular joint operative arthroscopy were assessed. A total of 549 surgical arthroscopic procedures were completed, including the reoperated joints. Approximately 156 patients underwent bilateral temporomandibular joint surgery (312 joints), whereas 138 patients underwent unilateral temporomandibular joint surgery (138 joints) (Table II). The follow-up period ranged from 3 to 57 months, with a mean of 26.2 months. A total of 99 joints (22%)

Table II. Temporomandibular joint data

Type of procedure	*No. of joints*
Unilateral	138 (138 patients)
Bilateral	312 (156 patients)

Table III. Reoperation summary

Reoperations	*No. of joints/no. of patients*
Unilateral	27/27
Bilateral	72/36
Total	99/63 (22% of all joints)

Table IV. Outcome measure—pain

Subjective assessment of pain by patients	*Visual Analog Scale (0-10 cm)*
Preoperative	8.8 ± 1.5
Postoperative	3.2 ± 1.9*

*$P \leq .01$.

Table V. Outcome measure—range of motion

Maximal interincisal opening (mm)	
Preoperative	28.3 ± 3.1
Postoperative	39.2 ± 3.4*

*$P \leq .01$.

Table VI. Outcome measure—lateral excursion

Lateral excursion (mm)	
Preoperative	3.5 ± 1.2
Postoperative	7.6 ± 2.0*

*$P \leq .01$.

Table VII. Outcome measure—protrusive excursion

Protrusive excursion (mm)	
Preoperative	2.1 ± 0.9
Postoperative	4.0 ± 1.1*

$P \leq .05$.

underwent another temporomandibular joint surgical procedure, 27 of which were unilateral (27.3% of reoperations) and 72 of which were bilateral (72.7%) (Table III). After the second surgical procedure, only 10 joints failed to show improved pain reduction. Seven of these 10 joints were subsequently treated with a diskal plication procedure, and 3 joints underwent multiple surgical procedures including diskal plication, diskectomies, and total joint reconstruction with an alloplastic prosthesis. The Visual Analogue Scale preoperatively ranged from 6 to 10, with a mean of 8.8; postoperatively, it ranged from 2 to 6, with a mean of 3.2 (Table IV). Maximal vertical mouth-opening preoperatively ranged from 6 mm to 40 mm, with a mean of 28.3 mm; postoperatively, it ranged from 30 mm to 53 mm, with a mean of 39.2 mm (Table V). The preoperative lateral movements ranged from 2 mm to 5 mm, with a mean of 3.5 mm; postoperatively they ranged from 5 mm to 10 mm, with a mean of 7.6 mm (Table VI). Similarly, protrusive movements also improved postoperatively (Table VII). The results documenting the reduction of pain, improved mouth-opening, and lateral and protrusive excursions were all statistically significant ($P \leq .01$). Most of the patients were diagnosed with disk displacement without reduction (97%). The majority of the 99 joints (22%) that underwent reoperation were classified during the first arthroscopy as Bronstein[22] and Merill stage IV or V (Table VIII).

DISCUSSION

The surgical options for the treatment of painful refractory temporomandibular joint internal derangements include arthrocentesis, arthroscopic surgery, diskal plication, diskectomies, and condylotomies. Condylotomies show a 94% favorable outcome for treating Wilkes' stage I and II temporomandibular joint disease that fails to respond to appropriate nonsurgical management.[23-24] Advocates of this technique believe that condylotomies provide an extra-articular solution for the painful nonreducing disk and remove the need for intra-articular exploration. On the other hand, proponents of open arthrotomies believe that a diskal plication or a diskectomy ensures an equally favorable outcome. In this study, we documented a 22% incidence of temporomandibular joint reoperation after temporomandibular joint arthroscopic surgery. In addition to improved surgical outcomes, including a statistically significant 66% reduction in the amount of pain, a significant improvement in vertical mouth-opening, as well as in lateral and protrusive excursive movements, were documented. We have not analyzed other outcomes such as the jaw dysfunction score or activities of daily living, because the charts did not include complete comprehensive data. Not unexpectedly, this study—like many retrospective studies—is limited in terms of its ex post facto nature. Our results are in concordance with those of reports published in the literature documenting a success rate of surgical arthroscopy that ranges between 60% and 93%.[16-21,25] We also noted that most of the patients who required an additional arthroscopic procedure had an advanced stage of internal derangement of the temporomandibular joint. On the other hand, many patients with advanced internal derangement who were treated arthroscopically did not require an additional surgical procedure. In 1996, Murakami et al[25] documented the 93% success rate of arthroscopic

Table VIII. Distribution of the sample with respect to stages of internal derangement

Bronstein classification	*Sample (%)*	*Reoperation (%)*	*Further procedures*	*Average follow-up (y)*
I	3	0	0	2.5
II	41	6	0	2.9
III	36	3	8	3.1
IV	11	58	44	2.8
V	9	33	48	2.5

surgical procedures performed on patients with stage V internal derangement. Our results also show that the reoperation procedures were performed within 6 months to a year after the last surgical arthroscopy. Our clinical experience is in accordance with the observation of Moses and Poker,[26] in that surgical arthroscopic failure occurs within the first month after surgery.[26] In addition, only 10% of the patients who had an unsuccessful result after a second surgical arthroscopy underwent further surgical intervention (open arthrotomy). Half of those patients had a reduction in pain and improved maximal mouth-opening; however, it is difficult to draw a conclusion about these patients because of the sample size and limited follow-up. These results are in agreement with those reported by Van Sickels and Dolezal,[27] who suggested caution in proceeding with open arthrotomy after failed temporomandibular joint arthroscopic surgery.

Lastly, our results support the premise that arthroscopic surgery is an appropriate treatment for patients with temporomandibular joint internal derangements that failed to respond to nonsurgical therapy, because reoperation was required in only approximately 20% of patients.

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