the Journal of CONTEMPORARY DENTAL PRACTICE at www.thejcdp.com
Volume 9 Number 3 March 1, 2008

Arthroscopy vs. Open-joint Surgery for the Management of Internal Derangement of the Temporomandibular Joint: A Retrospective Study Comparing Female Subjects from Two Centers

Joseph Hobeiche, DCD, DU, DEA; Ziad Salameh, DDS, DESP, MS;
Esam Tashkandi, BDS, MS, FDS RCS, PhD;
Khalid Almas, BDS, MSc, FDSRCS, FRACDS, DDPH, FICD, FADI

Abstract

Aim: The aim of this retrospective study was to assess the treatment outcome of arthroscopy and open-joint surgery in the management of internal derangement of the temporomandibular joint (TMJ).

Background: Apart from pain being the major complaint in patients with temporomandibular joint disorders (TMDs), a variety of function-related symptoms are reported including joint noises, locking, limited movement, and alterations in occlusion. Surgical management procedures of internal derangement of the TMJ vary widely at present. The criteria for the assessment of successful outcome of the treatment are also variable.

Methods and Materials: The retrospective study was carried out at two centers in Paris and Beirut. Sixty-two female patients with an age range of 35.1 years (28 had arthroscopy and 34 had open surgery) were included in the study. The patients were followed-up for 12 months. A standardized questionnaire and visual analogue scale (VAS) was developed and used for the assessment of pain and mandibular range of motion. A chi-square test was used to observe the significance of difference among both groups.

Conclusion: Within the limitations of this study, it was concluded arthroscopic surgery appeared to be safe with pain reduction and increased mandibular range of motion for 80% of the patients. Further research is needed on a larger prospective sample to assess the comparison of both techniques in terms of enhanced quality of life among the study population.

Clinical significance: Arthroscopic surgery appears to be a safe, minimally invasive, and effective method for treating internal derangements of the TMJ.

Keywords: Temporomandibular joint dysfunction, treatment modalities, arthroscopy, female subjects

Citation: Hobeiche J, Salameh Z, Tashkandi E, Almas K. Arthroscopy vs. Open-joint Surgery for the Management of Internal Derangement of the Temporomandibular Joint: A Retrospective Study Comparing Female Subjects from Two Centers. J Contemp Dent Pract 2008 March; (9)3:048-055.

Introduction

Internal derangement of the temporomandibular joint (TMJ) may be defined as disruption within the internal aspects of the TMJ in which there is a displacement of the disc from its normal function relationship with the mandibular condyle and the articular portion of the temporal bone.[1] When non-surgical treatment fails to manage the patient's problems, a surgical approach is often advocated.[2] Many surgical procedures have been widely used in the treatment of internal derangement of the TMJ ranging from a minimally invasive technique, such as arthroscopy or arthrocentesis, to total joint replacement. Yet there is no consensus on which surgical approach is best.[3] A few studies have been performed comparing the outcomes of different surgical techniques. These studies have reported a similar degree of pain relief for the procedures being compared with no procedure being clearly more effective than the other.[4,5,6]

It is important for each TMJ surgical procedure to have appropriate indications and to evaluate the results in order to establish a standard of care as well as to monitor continuous quality improvement.[7] The recent development of TMJ arthroscopic surgery, a minimally invasive procedure, appears to have filled the clinical void between failed non-surgical treatment and open arthrotomy. In the past decade arthroscopic surgery has been used with increasing frequency to treat TMJ internal derangements that failed to improve following a reasonable course of non-surgical therapy.[8]

In this study the clinical outcome of arthroscopy and open TMJ surgery as a partial menisectomy and disc repair were evaluated in terms of one year post-operative pain and range of motion of TMJ.

Methods and Materials

The study was conducted in specialty clinics at two centers in Beirut, Lebanon and Paris, France. Sixty-two female Caucasian patients underwent surgical treatment for internal derangement of the TMJ at these sites between 2000 and 2003. The patients were followed for a 12-month period. The same inclusion and exclusion criteria were used to identify patients for enrollment in the study at each location (Table 1). Only the data from patients who completed the examinations before surgery and at intervals of one month and one year post surgery were analyzed (Table 2). Thirty-four patients (mean age 32.4 years) in this study (Arthroscopy Group) underwent arthroscopic lysis of the adhesions and lavage of the joint space and 28 patients (mean age 37.8 years) over-all age ranged 35.1 years underwent arthroplasty and laser partial menisectomy with disc repair (Open TMJ Surgery Group).

The diagnosis of internal derangement as non-reducing disc displacement was made based on clinical examination, panoramic radiographic, and magnetic resonance imaging (MRI) findings. A conservative management had been tried but failed to control symptoms. All surgery procedures were performed under general anesthesia. Arthroscopic surgery consisted of lysis and lavage

Table 1. The patient selection criteria.

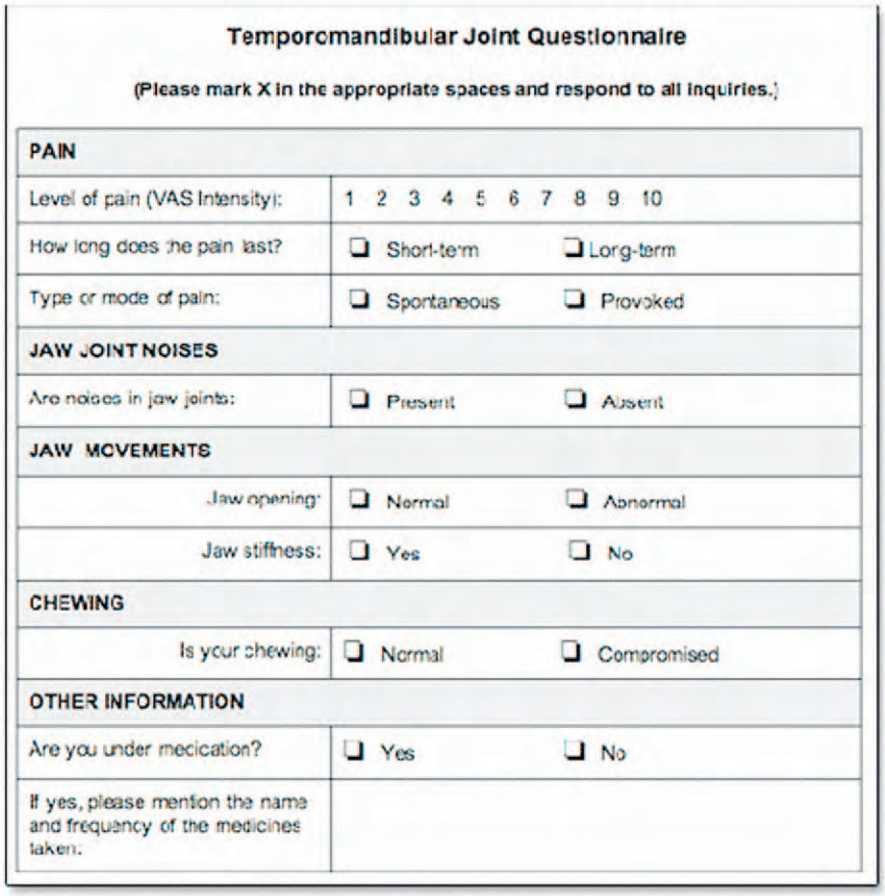
Inclusion and Exclusion Criteria
Inclusion
• Internal derangement as non-reducible disc displacement.
• Patient's age between 20 and 49 years old.
• Conservative occlusal device therapy has failed.
• Two of the following symptoms are present: > Pain > TMJ clicking >Chewing efficiency > Problem with mouth opening
Exclusion
• Facial trauma
• Previous TMJ surgery performed
• Osteoporosis
• Psychological problems

Table 2. Patients' group distribution according to treatment modality.

Treatment Modality	No. of Patients
Surgery	28
Arthroscopy	34
Total	62

of the joint space as described by Sanders.[9] The partial menisectomy with disc repair consisted of resection of a portion of posterior attachment and repositioning the disc.[10] Post surgical treatment included a combination of pharmacotherapy, splint therapy, and physical therapy. A standardized questionnaire was developed and used at both centers for clinical examinations (Figure 1).

A nurse was appointed at each site to conduct all patient examinations independently and to record data. These methods were discussed with the examiners by conference call in an effort to standardize method of measurement. The subjective Visual Analogue Scale (VAS) was used by patients to their perception of pain before surgery, at the completion of rehabilitation, and



Temporomandibular Joint Questionnaire

(Please mark X in the appropriate spaces and respond to all inquiries.)

PAIN		
Level of pain (VAS Intensity):	1 2 3 4 5 6 7 8 9 10	
How long does the pain last?	❑ Short-term	❑ Long-term
Type or mode of pain:	❑ Spontaneous	❑ Provoked
JAW JOINT NOISES		
Are noises in jaw joints:	❑ Present	❑ Absent
JAW MOVEMENTS		
Jaw opening:	❑ Normal	❑ Abnormal
Jaw stiffness:	❑ Yes	❑ No
CHEWING		
Is your chewing:	❑ Normal	❑ Compromised
OTHER INFORMATION		
Are you under medication?	❑ Yes	❑ No
If yes, please mention the name and frequency of the medicines taken:		

Figure 1. The questionnaire used. (Translated from French into English)

after 12 months.[4] Pain assessment on the VAS ranged from 0 to 10 with 0 representing no pain and 10 the worst pain. TMJ noise (clicking or crepitus) was also recorded. Mouth opening was determined by having the patient open maximally then measuring the distance between the incisal edges of the maxillary and mandibular central incisors in millimeters. Stiffness of the jaw and chewing function was also recorded.

The Chi-square test was used to assess if observed frequencies significantly differed from predicted frequencies. The change in maximum opening of jaws within each group was analyzed using a paired t-test. The comparison of maximum opening among groups was analyzed using Student's t-test. The significance level was set at ($p< 0.05$).

Results

Sixty-two female subjects were followed for 12 months after the surgery. The post-operative levels of pain in the two groups are presented in Table 3, Figure 2. Based on the VAS, the mean percentage of pain reduction for open surgery was 47% and 45% for arthroscopic surgery after 12 months. These reductions in pain were statistically significant ($p<0.05$) in the same group, but no significant difference was found between the two groups with regards to TMJ pain.

Thirty-two percent of the patients with open surgery and 26% of the arthroscopic surgery group had no further TMJ noise one year after surgery. Both surgical procedures significantly reduced the number of patients with joint clicking among all patients in the study. However, clicking was significant among the arthroscopy group.

One year following surgery the open surgery group showed a 50% reduction in maximum opening while only a 32% reduction was observed among the arthroscopy group. Jaw and muscle stiffness was significantly different after one year among the surgery group. The two groups experienced the same level of compromised chewing.

Table 3. Frequency distribution of pre- and post operative chewing, mouth opening, clicking, and joint stiffness pain among the studied population.

	Pre-Operative	Post Operative	Percentage Redn
Surgery (28)	18 (64%)	3 (11%)	54%
Arthroscopy (34)	17 (50%)	1 (3%)	47%
Compromised CHEWING			
Surgery (28)	24 (86%)	5 (18%)	68%
Arthroscopy (34)	16 (47%)	0 (0%)	47%
Problem with Mouth Opening			
Surgery (28)	24 (86%)	10 (36%)	50%
Arthroscopy (34)	23 (68%)	10 (36%)	32%
Clicking Sounds			
Surgery (28)	23 (82%)	14 (50%)	32%
Arthroscopy (34)	21 (62%)	10 (36%)	26%
Spontaneous Pain			
Surgery (28)	22 (79%)	12 (43%)	36%
Arthroscopy (34)	25 (74%)	5 (15%)	59%
Provocative Pain			
Surgery (28)	6 (21%)	5 (18%)	4%
Arthroscopy (34)	9 (26%)	8 (24%)	3%
Short Pain			
Surgery (28)	3 (11%)	3 (11%)	0%
Arthroscopy (34)	25 (74%)	13 (38%)	35%
Long Pain			
Surgery (28)	25 (89%)	6 (21%)	68%
Arthroscopy (34)	19 (56%)	1 (3%)	53%

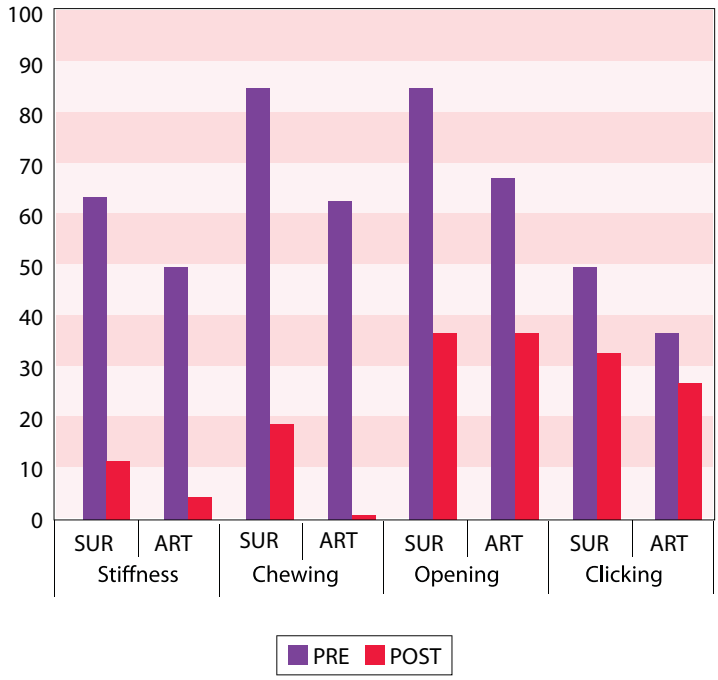


Figure 2. TMJ stiffness, chewing, mouth opening, and clicking among female subjects.

The clinical treatment procedures (arthroscopy and surgery) can be seen in Figures 3 and 4.

Figure 3. Arthroscopy.

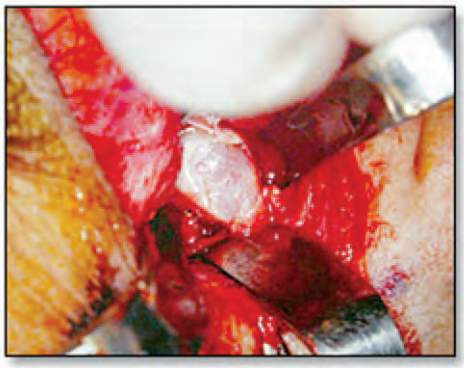


Figure 4. Open TMJ surgery.

Discussion

The surgical treatment of disorders of the TMJ has always been directed at restoration of normal biologic form and function. A return to normal may not be a realistic expectation due to the damage from the internal derangement. A recuperative period of vigorous physical therapy designed to return the TMJ to a functional range that is manageable with either a reduction in pain or the elimination of pain are frequently acceptable goals.[11]

Long-term follow-up using standardized techniques for clinical examination, a large number of subjects, and a minimal number of dropouts from the patient pool are important for retrospective studies.[2] This was a short-term cohort study using a standardized technique for the clinical examination and performing a 12-month follow-up to minimize the number of dropouts which has been reported to be a minimum duration for a retrospective study.[12]

Menisectomy is an operation frequently used in surgery of the TMJ. The results of the present study are in agreement with previous studies

which indicate this technique is significantly effective in relieving TMJ pain and noise.[13] Some surgeons report TMJ noise and/or pain returned in approximately half of their patients following disc repositioning surgery which is also in agreement with the findings of the present study.[12] This result suggests the surgeon's opinion on the integrity of the disc is essential to declare the surgical success of the open surgery approach. Both open surgery and arthroscopy significantly increased the maximum jaw opening. However, the maximum opening of the patients who underwent arthroscopy was significantly less than those who underwent open surgery.

The articular meniscus is important not only to achieve good condylar movement[14] but also to prevent fibrous ankylosis and/or an organic change of TMJ components. Therefore, surgical endeavors that preserve the disc should theoretically maximize patient benefits. The histopathologic change of the soft tissue in the TMJ is reported to be caused by chronic disc displacement.[15] Since the disc is avascular it has a little capacity for repair resulting in progressive degeneration and deformity. Therefore, early treatment is essential in order to preserve the disc.

Arthroscopic surgery significantly reduced all symptoms, however, clicking was more frequently and significantly observed in this group than the open surgery group. Some surgeons reported arthroscopic lysis and lavage of the joint space cannot recapture the disc.[16] Several studies reported a 80-90% success rate with arthroscopic lavage and lysis for the management of patients with painful limitation of mouth opening resulting from a closed lock of the TMJ.[17] A recent study showed arthroscopic anterolateral capsular release is a minimally invasive and effective surgical method for the treatment of patients with TMJ intracapsular disorders.[18]

Reduction of pain is thought to be caused by removal of the inflammatory substance within the joints and the increased disc mobility, which prevents adverse load concentration on the supporting tissue. Surgical procedures to re-establish a normal structural relationship should continue as a treatment option when appropriate, but arthroscopy with lysis and lavage also remains a viable option. At this time, it is not clear which patients, and what types of internal derangement, will benefit the most from such therapy as there appears to be equal benefit for all categories of patients.

The findings of the present study are in accord with other studies describing the results of both open surgery and arthroscopic surgery of the TMJ.[19] Long-term follow up will be necessary to determine if short-term results will endure.

The prevalence of temporomandibular joint disorders (TMDs) has been observed most frequently among women,[20,21,22] therefore, one reason to confine the study to only female patients is justified. In the future both gender and age comparisons may be important. Various studies have also indicated the frequency of the signs and symptoms of TMD increase with age.[20,23,24,25]

Conclusion

There are several surgical procedures available for the treatment of internal derangement, or disc displacement with or without reduction, perforation of the articular disc or of the disc and/or the articulating surfaces.[26]

Arthroscopic surgery appears to be a safe, minimally invasive, and effective method for treating internal derangements of the TMJ, reducing pain, and increasing mandibular range of motion for approximately 80% of patients. Although these results are encouraging, they are based on a retrospective, uncontrolled study.

Further research is needed on a larger sample size of both male and female subjects for a longer period of time comparing both treatment modalities in terms of enhanced quality of life among the studied population.

References

1. Dolwick MF, Katzberg RW, Helms CA. Internal derangements of the temporomandibular joint: fact or fiction? J Prosthet Dent 1983; 49:415-18.
2. Ericksson L, Westesson P-L. Long term evaluation of menisectomy of the temporomandibular joint. J Oral Maxillofac Surg 1985; 43:263.
3. Reston JT, Turkelson CM. Meta-analysis of surgical treatments for temporomandibular articular disorders. J Oral Maxillofac Surg 2003; 61:3-10.
4. Hall HD, Indresano AT, Kirk WS, Dietrich MS. Prospective multicenter comparison of 4 temporomandibular joint operations. J Oral Maxillofac Surg 2005; 63:1174-79.
5. Holmlund AB, Axelsson S, Gynther GW. A comparison of discectomy and arthroscopic lysis and lavage for the treatment of chronic closed lock of the temporomandibular joint: a randomized outcome study. J Oral Maxillofac Surg 2001; 59:972-77.
6. Miyamoto H, Sakashita H, Miyata M, Goss AN. Arthroscopic surgery of the temporomandibular joint: comparison of two successful techniques. Br J Oral Maxillofac Surg 1999; 37:397-400.
7. Kuwahara T, Bessette RW, Maruyama T. A retrospective study on the clinical results of temporomandibular joint surgery. Cranio 1994; 12:179-83.
8. Godden DR, Robertson JM. The value of patient feedback in the audit of TMJ arthroscopy. Br Dent J 2000; 188:37-9.
9. Sanders B. Arthroscopic surgery of the temporomandibular joint: treatment of internal derangement with persistent closed lock. Oral Surg Oral Med Oral Pathol 1986; 62:361-72.
10. Wilkes CH. Surgical treatment of internal derangements of the temporomandibular joint. A long-term study. Arch Otolaryngol Head Neck Surg 1991; 117:64-72.
11. Mosby E. Efficacy of temporomandibular joint arthroscopy: A retrospective study. J Oral Maxillofac Surg 1993; 51:17-21.
12. Holmlund AB. Surgery for TMJ internal derangement. Evaluation of treatment outcome and criteria for success. Int J Oral Maxillofac Surg 1993; 22:75-77.
13. Weinberg S, Cousens G. Meniscocondylar placation: a modified operation for surgical repositioning of the ectopic temporomandibular joint meniscus. Oral Surg Oral Med Oral Pathol 1987; 63:393-402.
14. Osborn JW. The disc of the human temporomandibular joint: design, function and failure. J Oral Rehabil 1985; 12:293-297.
15. McCoy JM, Gotcher JE, Chase DC. Histological grading of TMJ tissues in internal derangement. J Craniomand Pract 1986; 4:213-218.
16. Montgomery MT, Gordon SM, Van Sickels JE, Harms SE. Change in signs and symptoms following temporomandibular joint disk repositioning surgery. J Oral Maxillofac Surg 1992; 50:320-328.
17. Dimitroulis G. The role of surgery in the management of disorders of the temporomandibular joint: a critical review of the literature Part II. Int J Oral Maxillofac Surg. 2005; 34:231-237.
18. Kaneyama K, Segami N, Sato J, Murakami KI, Iizuka T. Outcomes of 152 temporomandibular joints following arthroscopic anterolateral capsular release by holmium: YAG laser or electro-cautery. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2004; 97:546-51.
19. Grabler MJ, Green CS, Placios E, Perry HT. Effect of arthroscopic temporomandibular joint surgery on articular disc position. J Craniomandib Disord Facial Oral Pain 1989: 3:191-95.
20. Jensen R, Rasmussen BK, Pedersen B, Lous I, Olesen J. Prevalence of oromandibular dysfunction in a general population. J Orofac Pain 1993; 7:175-182.
21. Koidis PT, Zarifi A, Grigoriadou E, Garefis P. Effect of age and sex on craniomandibular disorders. J Prosth Dent 1993; 69:93-101.
22. Shiau Y, Chang C. An epidemiological study of temporomandibular disorders in university students of Taiwan. Community Dent Oral Epidemiol 1992; 20:43-47.
23. Magnusson T, Carlsson GE, Egermark I. Changes in subjective symptoms of craniomandibular disorders in children and adolescents during a 10-year period. J Orofac Pain 1993; 7:76-82.
24. McNamara JA Jr, Seligman DA, Okeson JP. Occlusion, orthodontic treatment, and temporomandibular disorders: a review. J Orofac Pain 1995; 9:73-90.

25. Nordstrom G, Eriksson S. Longitudinal changes in craniomandibular dysfunction in an elderly population in northern Sweden. Acta Odontol Scand 1994; 52:271-279.
26. Undt G, Murakami KI, Clark GT, Ploder O, Dem A, Lang T, Wiesinger GF. Cross-cultural adaptation of the JPF-Questionnaire for German-speaking patients with functional temporomandibular joint disorders. J Craniomaxfac Surgery 2006; 34:226-233.

About the Authors

Joseph Hobeiche, DCD, DU, DEA

Dr. Hobeiche is a Clinical Assistant Professor in the Department of Fixed Prosthodontics and Occlusion of the Faculty of Dental Medicine at Saint Joseph University in Beirut, Lebanon. His primary professional interests include the treatment of temporomandibular disorder, patient's pain management, full mouth rehabilitation including dental implants, surgery, and prosthodontics. Dr. Hobeiche is member of several national and international professional organizations.

e-mail: joey64@idm.net

Ziad Salameh, DDS, DESP, MS

Dr. Salameh is a Prosthodontist in the Department of Prosthodontics of the College of Dentistry at King Saud University in Riyadh, Saudi Arabia. His clinical interests include temporomandibular disorder management, comprehensive dental treatment, and reconstruction of endodontically treated teeth. Dr. Salameh has lectured at several regional and international dental conferences.

e-mail: ziadplanet@yahoo.com

Esam Tashkandi, BDS, MS, FDS RCS, PhD

Dr. Tashkandi is an Assistant Professor and Chairman, Department of Prosthodontics, College of Dentistry, King Saud University in Riyadh, Saudi Arabia. His clinical interests include full-mouth rehabilitation, facial pain management, and dental implants. Dr. Tashkandi has lectured nationally and internationally at many dental forums.

e-mail: esamtash@ksu.edu.sa

Khalid Almas, BDS, MSc, FDSRCS, FRACDS, DDPH, FICD

Dr. Almas is an Associate Professor in the Division of Periodontology at the University of Connecticut School of Dental Medicine in Farmington, CT, USA. His research interests include clinical research, systemic diseases and periodontal health, oral malodor, full mouth rehabilitation, implant survival, and management of peri-implantitis. Dr. Almas is a member of many professional organizations and serves on many dental journal editorial boards. He has lectured nationally and internationally.

e-mail: Khalidalmas@yahoo.com

Acknowledgements

The authors wish to thank Dr. Hani F. Ounsi for his valuable suggestions in manuscript preparation.