

MEDICAL SCIENCES

УДК 616.724-001.6-089.23

ARTHROSCOPY VS SPLINT-THERAPY IN MANAGING THE TMD: A REVIEW

Vovk Viktorija Viktorivna,
phD, assistant

Nespryadko Valeriy Petrovych,
DMS, professor of Department of Prosthetic dentistry

Kofanov Veniamin Oleksiiovych,
student of NMU O. O. Bogomolca

Vovk Viktor Tymofijovych
assistant of Department of Nursing of
Zhytomyr Medical Institute Zhytomyr Regional Council

Background: Temporomandibular Disorder (TMD) is the main cause of non-dental origin pain in the orofacial region including head, face and related structures. The etiology and the pathophysiology of TMD is poorly understood. It is generally accepted that the etiology is multifactorial, involving a large number of direct and indirect causal factors. TMD pain remains a diagnostic and management challenge for many clinicians. It is estimated that 40% to 75% of the population displays at least one sign of the disease and 33% of the population reports at least one symptom. Arthroscopy has been used to reduce signs and symptoms of patients with TMD but the effectiveness has still not been totally explained.

Materials and methods: meta-analysis. Using the keywords «TMJ» and «Arthroscopy» 791 articles were found in the PubMed database. We selected 18 articles published between December 1988 and January 2022. Considering the absence of clear and gradually structured protocols of patients` management with TMD three questions were asked: 1. In what cases it is more preferably to use the arthroscopy? 2. What are the advantages and disadvantages of the arthroscopy? 3. Is

it safer to use the splint-therapy over arthroscopy?

Results: nowadays arthroscopy is a popular minimally invasive approach which is the safest among all surgical procedures in the area of TMJ such as open arthroplasty and total joint reconstruction. Its goal is a lavage, lysis of fibrous adhesions and even a reposition of a disc. In its simplest form, a 1.9 or smaller arthroscope is placed in the TMJ either through a posterior puncture or an anterior puncture or portal. Scopes as long as 2.3 have been used, and even working instruments as large as almost 3 mm can be utilized with or without the protective casing. Arthroscopy can be as simple as a single puncture in the TMJ with an outflow system created with an 18- gauge needle to a more complex procedure using multiport or triangulation techniques involving the use of 1 portal for the arthroscope and the second portal for instrumentation. Instrumentation can range from forceps to graspers, spinal needles to inject, shavers, electrocauteries, and lasers. But there are a lot of mentions of probable complications in the literature starting from 1988 year which occur during the surgery in the area of TMJ. The longevity of post-operative results remains uncertain. (1)

On the other hand, splint-therapy is conservative approach, the purpose if which is to improve biomechanics of TMJs. There are approximately 120 different types of splints, but all of them can be classified as muscle reconditioning and repositioning splint based on their mechanism of action. The function of splints is directly related to a disc-head of mandible complex optimization and as a result, improvement of TMJs biomechanics.

One study indicates that psychiatric comorbidities, high self-graded global pain, bilateral masticatory muscle tenderness, and small maximum interincisal opening (MIO) predict an unsuccessful outcome after arthroscopic lysis and lavage (2), while another study concludes that disc shape and the absolute or probable absence of a crumpled disc on MRI might be used as predictive variable for success (3)

One publication shows that age has no influence on the outcome after arthroscopy. A higher presurgical MIO and the presence of adhesions provide, in the

long-term, a favorable prognosis (4) Table 2.

Three articles found next complications: laceration of external auditory canal, immediate partial hearing loss, sensory disturbances over the distribution of auriculotemporal nerve, haemorrhage as visualised by excessive bleeding through trocar skin puncture wound, post-operative pain more than the pre-operative pain on the immediate post-operative day, reduction in spontaneous mouth opening was noted in 15 patients, ear fullness, vertigo, alteration of visual accuracy of the ipsilateral eye Table1. All complications were minor which resolved without any intervention (5,6,7)

One publication showed vascular injury in the points of trocar insertion, lesions of the fibrocartilage layer of the joint secondary to introduction of instruments, extravasation of irrigation fluid, affecting the oropharyngeal space (8)

Other authors indicate broken instrument as a complication, but it's more related to a mistake made by operator as a result of using an old instrument or not following exact rules on working with specific instruments (1)

One study shows absence of severe and irreversible complications most of which were resolved after 4 weeks but found that double-portal was associated with more complications compared with single-portal TMJ arthroscopy such as intra-articular bleeding and oedema of the preauricular area. (9).

Two studies show pain improvements, perceived jaw dysfunction improvement and mouth opening had improved in the long-term (10, 11).

Seven publications showed significant post-operative hearing loss which was observed in less than 1% of patients according to some authors and conducted pre- and post-operative audiograms indicate statistically significant differences in frequencies 256 Hz and 8kHz according to other authors. Also, one of these studies describes the persistent foramen of Huschke, an area of incomplete ossification of the tympanic plate of the temporal bone present in some persons. The presence of this foramen may render middle and inner ear structures vulnerable to injury during arthroscopy of the TMJ. (7,8,12-16)

One publication indicates that in comparison with standard, arthroscopy with

hyaluronic acid showed statistically poor difference in efficacy. This fact becomes not significant in choosing type of the arthroscopy. (17)

One of the latest publications indicates that a minimally invasive single portal arthroscopic discectomy is an effective technique to improve function and pain reduction in patients with anterior disk displacement with or without reduction. (18)

Table 1.

Distribution of common complications found in publications

Type of a complication	Number of articles mentioning such complication
Hearing loss	7
Vertigo	6
Intra-articular bleeding	3
Facial nerve palsy	2
Lacerations of external acoustic meatus	2
Reduction in spontaneous mouth opening	1

Table 2.

Predictive Factors for the outcome of arthroscopy

Factor	Prognosis
higher presurgical MIO; presence of adhesions	Favorable
psychiatric comorbidities; high self-graded global pain; bilateral masticatory muscle tenderness; and small MIO; presence of a crumpled disc on MRI; decreased compliance	Unfavorable
Age	No influence

Conclusions: 1. Arthroscopy is preferably to use in cases of absence of psychiatric comorbidities, high self-graded global pain, bilateral masticatory muscle tenderness, and small MIO, associated with a poor outcome. Also, if conservative treatment doesn't show any improvements and MRI scans show the presence of fibrous adhesions and in particular the absence of crumpled disc, it is recommended to use the minimally invasive approach. 2. There are found many common complications of TMJ arthroscopy such as minimal auditive threshold changing,

vertigo, intra-articular bleeding, facial nerve palsy, lacerations of external acoustic meatus and reduction in spontaneous mouth opening. On the other hand, there are mentions of pain, jaw dysfunction and mouth opening improvement. 3. Considering all possible complications, it becomes obvious that choosing splint-therapy over arthroscopy is safer when the clinical situation allows it.

REFERENCES

1. Hoffman D, Puig L. Complications of TMJ surgery. *Oral Maxillofac Surg Clin North Am.* 2015 Feb;27(1):109-24. doi: 10.1016/j.coms.2014.09.008. PMID: 25483447.
2. Ulmner M, Kruger-Weiner C, Lund B. Patient-Specific Factors Predicting Outcome of Temporomandibular Joint Arthroscopy: A 6-Year Retrospective Study. *J Oral Maxillofac Surg.* 2017 Aug;75(8):1643.e1-1643.e7. doi: 10.1016/j.joms.2017.04.005. Epub 2017 Apr 13. PMID: 28487216.
3. Vervaeke K, Verhelst PJ, Orhan K, Lund B, Benchimol D, Van der Cruyssen F, De Laat A, Jacobs R, Politis C. Correlation of MRI and arthroscopic findings with clinical outcome in temporomandibular joint disorders: a retrospective cohort study. *Head Face Med.* 2022 Jan 7;18(1):2. doi: 10.1186/s13005-021-00305-y. PMID: 34996509; PMCID: PMC8739711.
4. Muñoz-Guerra MF, Rodríguez-Campo FJ, Escorial-Hernández V, Brabyn PJ, Fernández-Domínguez M, Naval-Gías L. Is There a Relationship Between Age, Personal Factors or Surgical Findings, and Outcome After Temporomandibular Joint Arthroscopy? *J Oral Maxillofac Surg.* 2021 May;79(5):1000-1008. doi: 10.1016/j.joms.2020.12.016. Epub 2020 Dec 15. PMID: 33434521.
5. Tsuyama M, Kondoh T, Seto K, Fukuda J. Complications of temporomandibular joint arthroscopy: a retrospective analysis of 301 lysis and lavage procedures performed using the triangulation technique. *J Oral Maxillofac Surg.* 2000 May;58(5):500-5; discussion 505-6. doi: 10.1016/s0278-2391(00)90010-7. PMID: 10800905.
6. González-García R, Rodríguez-Campo FJ, Escorial-Hernández V,

Muñoz-Guerra MF, Sastre-Pérez J, Naval-Gías L, Gil-Díez Usandizaga JL. Complications of temporomandibular joint arthroscopy: a retrospective analytic study of 670 arthroscopic procedures. *J Oral Maxillofac Surg.* 2006 Nov;64(11):1587-91. doi: 10.1016/j.joms.2005.12.058. PMID: 17052583.

7. Chowdhury SKR, Saxena V, Rajkumar K, Shadamarshan RA. Complications of Diagnostic TMJ Arthroscopy: An Institutional Study. *J Maxillofac Oral Surg.* 2019 Dec;18(4):531-535. doi: 10.1007/s12663-019-01202-3. Epub 2019 Feb 26. PMID: 31624430; PMCID: PMC6795641.

8. Fernández Sanromán J, Costas López A, Fernández Ferro M, de Sánchez AL, Stavaru B, Arenaz Bua J. Complications of temporomandibular joint arthroscopy using two-portal coblation technologies: A prospective study of 475 procedures. *J Craniomaxillofac Surg.* 2016 Sep;44(9):1221-5. doi: 10.1016/j.jcms.2016.06.027. Epub 2016 Jul 2. PMID: 27443801.

9. Ângelo DF, Araújo RAD, Sanz D. Surgical complications related to temporomandibular joint arthroscopy: a prospective analysis of 39 single-portal versus 43 double-portal procedures. *Int J Oral Maxillofac Surg.* 2021 Aug;50(8):1089-1094. doi: 10.1016/j.ijom.2020.07.020. Epub 2021 Jan 22. PMID: 33495103.

10. Jerjes W, Upile T, Shah P, Abbas S, Vincent A, Hopper C. TMJ arthroscopy in patients with Ehlers Danlos syndrome: case series. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2010 Aug;110(2):e12-20. doi: 10.1016/j.tripleo.2010.03.024. PMID: 20659691.

11. Rigon M, Pereira LM, Bortoluzzi MC, Loguercio AD, Ramos AL, Cardoso JR. Arthroscopy for temporomandibular disorders. *Cochrane Database Syst Rev.* 2011 May 11;(5):CD006385. doi: 10.1002/14651858.CD006385.pub2. Update in: *Cochrane Database Syst Rev.* 2015;12:CD006385. PMID: 21563153.

12. Ângelo DF, Moreira A, Sanz D, São João R. Hearing changes after temporomandibular joint arthroscopy: a prospective study. *Int J Oral Maxillofac Surg.* 2021 Nov;50(11):1491-1495. doi: 10.1016/j.ijom.2021.02.013. Epub 2021 Mar 11. PMID: 33714614.

13. Applebaum EL, Berg LF, Kumar A, Mafee MF. Otologic complications following temporomandibular joint arthroscopy. *Ann Otol Rhinol Laryngol*. 1988 Nov-Dec;97(6 Pt 1):675-9. doi: 10.1177/000348948809700618. PMID: 3202572.
14. Cheynet F, Chossegros C, Blanc JL, Gola R, Lachard J. Les complications de l'arthroscopie temporo-mandibulaire. A propos de 100 arthroscopies [Complications of temporo-mandibular arthroscopy. Report of 100 arthroscopies]. *Rev Stomatol Chir Maxillofac*. 1992;93(4):252-7. French. PMID: 1411221.
15. Herzog S, Fiese R. Persistent foramen of Huschke: possible risk factor for otologic complications after arthroscopy of the temporomandibular joint. *Oral Surg Oral Med Oral Pathol*. 1989 Sep;68(3):267-70. doi: 10.1016/0030-4220(89)90208-9. PMID: 2771372.
16. Van Sickels JE, Nishioka GJ, Hegewald MD, Neal GD. Middle ear injury resulting from temporomandibular joint arthroscopy. *J Oral Maxillofac Surg*. 1987 Nov;45(11):962-5. doi: 10.1016/0278-2391(87)90450-2. PMID: 3312539.
17. Castaño-Joaqui OG, Cano-Sánchez J, Campo-Trapero J, Muñoz-Guerra MF. TMJ arthroscopy with hyaluronic acid: A 12-month randomized clinical trial. *Oral Dis*. 2021 Mar;27(2):301-311. doi: 10.1111/odi.13524. Epub 2020 Jul 25. PMID: 32609918.
18. Martínez-Gimeno C, García-Hernández A, Martínez-Martínez R. Single portal arthroscopic temporomandibular joint discopexy: Technique and results. *J Craniomaxillofac Surg*. 2021 Mar;49(3):171-176. doi: 10.1016/j.jcms.2021.01.004. Epub 2021 Jan 19. PMID: 33546966.