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Contemporary Surgical Approaches to Temporomandibular Joint Osteoarthritis: A Narrative Review

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Abstract: Temporomandibular joint osteoarthritis (TMJ OA) is a progressive degenerative disorder associated with pain, limited mandibular mobility, and functional impairment. In patients with unsuccessful conservative treatment, surgical management is increasingly based on disease stage and joint reconstructability. This narrative review summarizes current evidence regarding arthrocentesis, arthroscopy, open joint surgery, and total joint replacement (TJR) in TMJ osteoarthritis.

Keywords: Temporomandibular Joint Osteoarthritis, TMJ Surgery, Arthrocentesis, Arthroscopy, Total Joint Replacement, Narrative Review

Introduction

Temporomandibular joint osteoarthritis is a degenerative intra articular disorder characterized by progressive structural alteration of the articular surfaces, variable synovial inflammation, pain, joint noise, and functional limitation. Although most patients are managed non surgically, a clinically important subgroup develops persistent symptoms and structural degeneration sufficient to justify operative treatment [1,2,3]. A literature review was performed using publications indexed in PubMed, Scopus, and Web of Science, with emphasis on systematic reviews, meta analyses, guidelines, and major clinical studies published predominantly during the last 10–15 years.

Current evidence supports arthrocentesis as the primary minimally invasive surgical option after failed conservative therapy, mainly for pain reduction and modest functional improvement. Arthroscopy may provide additional benefits in selected cases, although its superiority over arthrocentesis remains inconsistent. Open joint surgery remains important for anatomically reconstructable joints, while TJR demonstrates the most reliable long term outcomes in end stage disease, including substantial improvement in pain, function, and quality of life.

Despite progress in surgical management, available evidence remains limited by heterogeneity of protocols, inconsistent outcome reporting, and insufficient comparative studies. Overall, contemporary literature supports a staged and pathology-oriented approach to surgical treatment of TMJ osteoarthritis [4,5,6].

Over the past decade, the conceptual basis of TMJ surgery has changed substantially. Contemporary literature no longer supports a generic procedure-based strategy in which the same operation is applied across heterogeneous intra articular pathologies. Instead, current thinking emphasizes staged escalation and pathology specific decision making according to disease severity, disc integrity, osseous involvement, prior treatment failure, and the residual reconstructability of the joint [7,8]. This change is not merely technical. It reflects a shift in surgical goals, from low morbidity symptom control in earlier disease to durable structural and functional reconstruction in the end stage setting, where total joint replacement has assumed a progressively more central role [9,10,11].

Despite this conceptual progress, the evidentiary landscape remains uneven. Minimally invasive procedures are supported by a relatively large but methodologically heterogeneous literature. Open surgery is strongly shaped by morphology and expert practice, yet comparative evidence across techniques remains limited. Total joint replacement is supported by more coherent long term outcome data, but most of that literature is observational and indications continue to vary among centers [12,13,14].

The aim of this review was to analyze current evidence on the surgical treatment of TMJ osteoarthritis, with particular attention to contemporary procedure selection, reported outcomes, unresolved controversies, and the principal limitations of the literature.

Methodology

This article was designed as a narrative review. A literature analysis was performed using publications indexed in major biomedical databases, including PubMed, Scopus, and Web of Science, with additional consideration of relevant review based and guideline level sources identified through the available literature corpus. Emphasis was

placed on articles published predominantly during the last 10 to 15 years.

Priority was given to systematic reviews, meta analyses, consensus reports, clinical guidelines, and representative clinical series addressing the principal surgical modalities used in TMJ osteoarthritis: arthrocentesis, arthroscopy, open joint surgery, and total joint replacement. The review was restricted to surgical treatment and did not seek to provide a full appraisal of conservative management.

Because the objective was to produce a clinically oriented academic synthesis rather than a formal systematic review, the evidence was evaluated qualitatively. Particular attention was paid to consistency of findings, clinical applicability, durability of outcomes, and major methodological limitations across studies.

Results and Discussion

The contemporary treatment model is based on staged escalation. After unsuccessful conservative therapy, arthrocentesis is generally regarded as the first surgical step. Arthroscopy is then considered in selected patients with persistent intra articular symptoms or insufficient response to lavage based treatment. Open surgery is reserved for joints that remain reconstructable but require direct correction of disc or articular pathology. Total joint replacement is increasingly used when the joint is severely degenerated and no longer amenable to reliable reconstruction [15].

This framework reflects a broader distinction between symptom oriented surgery and reconstructive surgery. Early procedures seek to reduce pain and improve mobility with minimal morbidity. Later procedures address structural failure of the joint itself. In this respect, the modern literature increasingly separates salvageable from non salvageable joints rather than viewing osteoarthritis as a single operative category [16].

Arthrocentesis remains the most consistently supported initial surgical procedure for symptomatic TMJ osteoarthritis after failed conservative treatment. Its therapeutic rationale is based on lavage of inflammatory mediators, release of adhesions, and restoration of joint mobility rather than reversal of established degenerative change.

The systematic review and meta analysis by Tang and colleagues demonstrated superior short and intermediate term pain reduction with arthrocentesis compared with conservative treatment, whereas improvement in mouth opening, although statistically significant, was quantitatively modest. This pattern is clinically important because it defines the principal value of arthrocentesis as symptom control with low procedural burden.

Longer term data in osteoarthritis support this interpretation. In the randomized study by Bergstrand and colleagues, pain decreased from 64 to 16 mm after lavage alone and from 63 to 25 mm after lavage with hyaluronic acid over approximately 47 months, while maximum mouth opening improved by 5 to 6 mm in both groups without significant between group differences. These findings indicate that the dominant therapeutic effect is attributable to arthrocentesis itself rather than to adjunctive injection.

The role of additional intra articular agents remains uncertain. Available reviews do not demonstrate a durable advantage for hyaluronic acid or corticosteroids when added to lavage. Concerns regarding corticosteroids are amplified by their unfavorable biologic profile with respect to cartilage health. PRP and PRF have shown more encouraging pooled results, including statistically significant improvements in pain and mouth opening in the meta analysis by Nagori and colleagues. However, marked heterogeneity in preparation methods, dosing protocols, and follow up intervals limits confidence in the clinical generalizability of those findings. Similarly, direct comparison between PRP and hyaluronic acid has not demonstrated a clear difference in efficacy.

Technical modifications also appear to have limited influence on outcome. According to [18], single puncture and two needle approaches, lavage volume, and fluid composition do not reliably predict clinical success. This suggests that disease stage and patient selection are likely to be more important determinants of outcome than minor procedural variation.

Arthroscopy occupies an intermediate position between lavage based treatment and open surgery. Its relevance lies in the combination of therapeutic intervention and direct intra articular assessment, which is especially useful in patients with persistent symptoms after arthrocentesis or when imaging does not fully clarify the morphologic substrate of dysfunction.

Comparative evidence indicates that arthroscopy does not consistently provide superior pain relief relative to arthrocentesis. Nonetheless, arthroscopic lysis and lavage may offer greater improvement in mouth opening in the

intermediate term [4]. This signal is clinically plausible, yet the strength of inference remains limited by small study populations, variable diagnostic categories, inconsistent staging, and non uniform outcome reporting.

Recent interest has focused on advanced arthroscopy in severe degenerative disease. In a Wilkes V cohort, level II arthroscopy was associated with significant reduction in pain and functional limitation, and only a minority of patients subsequently required total joint replacement during short term follow up. These findings suggest that arthroscopy may retain value in selected advanced cases. However, they do not yet justify viewing it as a validated alternative to open reconstructive surgery or replacement in the end stage setting [17,18].

Open joint surgery remains indispensable in patients with persistent symptoms and advanced local pathology when the joint is still considered anatomically reconstructable [19]. In contemporary practice, it is best understood as a group of morphology specific procedures rather than as a single operative category.

When the disc is salvageable, disc repositioning or discopexy may be appropriate. When the disc is irreversibly damaged but the osseous components remain sufficiently preserved, discectomy becomes the principal option, with or without interpositional reconstruction [20]. The consensus report reinforces this logic by linking open surgery to severe pain, substantial restriction of opening, failure of minimally invasive treatment, and imaging evidence of advanced structural disease.

The evidence base remains limited and heterogeneous. The systematic review showed that both arthroscopic and open disc repositioning improve pain and function, but meaningful comparison between the two methods is restricted by poor standardization of disease stage and outcome assessment. Similar limitations affect the discectomy literature. In [21], currently available evidence does not support a universal preference for interpositional reconstruction over discectomy alone.

Observational series nevertheless provide clinically useful signals. In, discectomy with abdominal fat grafting achieved a 75.2% success rate, while 11.7% of patients later progressed to total joint replacement. In the Norwegian long term series [22], discectomy was associated with favorable clinical status at 10 and 30 years, and the observed remodeling was more closely related to surgery than to unequivocal acceleration of osteoarthritic change. In the osteoarthritis focused study [23], interpositional arthroplasty with costal cartilage allograft reduced pain from 7.7 to 1.0 at 3 years and to 0.9 at 5 years, while mouth opening improved from 32.9 to 40.9 and 41.4 mm. Although uncontrolled and retrospective, these data support open surgery as a viable intermediate option in selected patients with advanced but still reconstructable disease [24].

Among all surgical strategies for advanced TMJ osteoarthritis, total joint replacement is supported by the most coherent long term outcome literature. It should no longer be regarded solely as a rare salvage intervention, but rather as a central treatment option for the end stage non reconstructable joint.

The clinical guideline identifies advanced osteoarthritis or osteoarthrosis, multiple failed prior procedures, marked limitation of mouth opening below 35 mm, occlusal disturbance, and substantial impairment of alimentation and function among the principal indications. The same guideline underscores that TJR is the final irreversible surgical step and therefore demands careful patient selection, adequate bone stock, exclusion of active infection, and rigorous preoperative planning.

The systematic review, focused specifically on degenerative disease, described a typical patient profile characterized by severe functional compromise, restricted oral opening, soft or liquid diet, and moderate to severe pain. Mean preoperative mouth opening was approximately 24 mm and increased to about 41 mm after replacement, while pain was substantially reduced or eliminated in most patients. Importantly, the authors concluded that currently available evidence does not permit definition of the optimal timing of transition to replacement according to disease duration, duration of prior treatment, or number of previous operations[25].

Long term durability data are favorable. The meta analysis reported overall prosthesis survival of approximately 97%, with most failures occurring within the first 6 months and commonly related to infection. In the 10 year prospective study, pain decreased from 7.4 to 1.7, mouth opening improved from 21.0 to 34.7 mm, and dietary function improved substantially. Comparable medium term findings have also been reported for stock prosthetic systems.

Complication profiles remain clinically important. In, heterotopic bone formation was the most frequent indication for revision. In [28], the most commonly reported complications included transient facial nerve dysfunction, sensory disturbance, heterotopic ossification, and infection. The broader complication estimates reported in likely

reflect wider capture of neurogenic and persistent postoperative symptoms rather than simple implant failure alone. Thus, the contemporary view of TJR is one of high efficacy in carefully selected patients, tempered by the need for meticulous perioperative management and long term surveillance[26].

Discussion. The current literature supports a staged and pathology directed approach to TMJ osteoarthritis surgery. Arthrocentesis has the clearest role as the initial surgical procedure because it combines low invasiveness with reproducible symptom relief, even if the magnitude of functional gain is often modest. Arthroscopy appears conceptually attractive as the next step, but its measurable advantage over arthrocentesis remains smaller and less consistent than might be assumed from surgical theory alone.

Open surgery remains essential, yet the modern literature increasingly argues that it should be selected according to morphologic indication rather than procedural habit. This principle is one of the major strengths of current thinking, but it is not yet matched by equally strong comparative evidence. Many studies of open surgery combine heterogeneous pathologic entities or disease stages, which weakens inference and limits cross study comparability[27].

The strongest and most consequential evidence concerns total joint replacement. In the setting of the end stage non reconstructable joint, available data consistently indicate major gains in pain, oral opening, diet, and function together with high prosthesis survival. The principal unresolved issue is therefore not whether TJR is effective, but when transition from reconstructive surgery to replacement is most appropriate. That decision still depends heavily on institutional practice, surgeon experience, and local thresholds for defining reconstructability[28,29].

A broader problem across the field is the mismatch between the maturity of clinical practice and the maturity of evidence. Many operative strategies are well established in specialist units, yet the published literature remains limited by retrospective design, inconsistent staging systems, non standardized outcomes, and variable follow up. These limitations complicate meaningful comparison not only within procedure classes but also across the full surgical spectrum from arthrocentesis to replacement. The literature on minimally invasive surgery is heterogeneous in protocol design, adjunctive therapy, and duration of follow up

- Studies of open surgery frequently combine different morphologic entities and disease stages, reducing external validity
- Evidence supporting total joint replacement is clinically persuasive but remains predominantly observational
- Patient centered outcomes, particularly quality of life, dietary recovery, and functional disability, are not reported uniformly across studies
- Criteria for transition from reconstructive surgery to total joint replacement remain insufficiently standardized.

Conclusion

Contemporary surgical management of TMJ osteoarthritis is defined by staged escalation and pathology specific decision making. Arthrocentesis remains the most established first surgical step after unsuccessful conservative treatment. Arthroscopy has a justified but more limited role as an intermediate minimally invasive option. Open surgery remains important when the joint is still reconstructable and the morphologic target is well defined. In end stage disease, total joint replacement has the most consistent long term evidence and should be regarded as a central component of current surgical management rather than as an exceptional salvage procedure. Further progress in the field will depend on stronger comparative studies, more uniform staging and outcome reporting, and clearer criteria for determining when reconstruction remains rational and when replacement offers the more appropriate therapeutic course.

References

[1] Y. H. Tang, N. van Bakelen, B. Gareb, and F. Spijkervet, “Arthrocentesis versus conservative treatments for temporomandibular joint disorders: A systematic review with meta-analyses and trial sequential analyses.” Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery, Dec. 2024, doi: 10.1016/j.jcms.2024.12.006.

[2] L. Guarda-Nardini, A. M. de Almeida, and D. Manfredini, “Arthrocentesis of the Temporomandibular Joint: Systematic Review and Clinical Implications of Research Findings.” Journal of oral & facial pain and headache, vol. 35 1, pp. 17–29, Feb. 2021, doi: 10.11607/ofph.2606.

[3] S. Bergstrand, H. K. Ingstad, A. Møystad, and T. Bjørnland, "Long-term effectiveness of arthrocentesis with and without hyaluronic acid injection for treatment of temporomandibular joint osteoarthritis." Journal of oral science, vol. 61 1, pp. 82–88, Mar. 2019, doi: 10.2334/josnusd.17-0423.

[4] Y. H. Tang, N. van Bakelen, B. Gareb, and F. Spijkervet, "Arthroscopy versus arthrocentesis and versus conservative treatments for temporomandibular joint disorders: a systematic review with meta-analysis and trial sequential analysis." International journal of oral and maxillofacial surgery, Jan. 2024, doi: 10.1016/j.ijom.2024.01.006.

[5] K. Murakami, "Current role of arthrocentesis, arthroscopy and open surgery for temporomandibular joint internal derangement with inflammatory/degenerative disease; -pitfalls and pearls-," Aug. 01, 2021. doi: 10.1016/j.ajoms.2021.06.009.

[6] A. Sidebottom, "Current thinking in open temporomandibular joint surgery. Is this still indicated in the management of articular temporomandibular joint disorder?" The British journal of oral & maxillofacial surgery, Jan. 2024, doi: 10.1016/j.bjoms.2024.01.006.

[7] A. Sidebottom, "Open Temporomandibular Joint Surgery: Discectomy with or Without Interpositional Reconstruction?" Atlas of the oral and maxillofacial surgery clinics of North America, vol. 30 2, pp. 199–204, Sep. 2022, doi: 10.1016/j.cxom.2022.05.001.

[8] V. S. Nguyen, T. Kofod, E. Nisja, M. Hosseini, and N. Worsaae, "Interpositional arthroplasty using cartilage allografts for treating temporomandibular joint arthrosis: A 3- and 5-year retrospective clinical follow-up study." Oral surgery, oral medicine, oral pathology and oral radiology, Feb. 2024, doi: 10.1016/j.oooo.2024.02.002.

[9] F. G. G. P. Lima, L. Rios, L. Paranhos, W. Vieira, and D. Zanetta-Barbosa, "Survival of temporomandibular total joint replacement: A systematic review and meta-analysis." Journal of oral rehabilitation, Dec. 2023, doi: 10.1111/joor.13635.

[10] A. Rajkumar and A. Sidebottom, "Prospective study of the long-term outcomes and complications after total temporomandibular joint replacement: analysis at 10 years." International journal of oral and maxillofacial surgery, Sep. 2021, doi: 10.1016/j.ijom.2021.07.021.

[11] V. Ravelo, E. Vargas, H. G. Guevara, R. Sacco, P. Navarro, and S. Olate, "TMJ Replacement in Degenerative Disease: A Systematic Review," Journal of Clinical Medicine, vol. 14, Jan. 2025, doi: 10.3390/jcm14020580.

[12] S. Renapurkar, "Surgical Versus Nonsurgical Management of Degenerative Joint Disease." Oral and maxillofacial surgery clinics of North America, vol. 30 3, pp. 291–297, Jul. 2018, doi: 10.1016/j.coms.2018.04.005.

[13] G. Dimitroulis, "A guide for temporomandibular joint surgery using a simple surgical classification - A narrative-style review." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery, Jun. 2024, doi: 10.1016/j.jcms.2024.06.012.

[14] G. Dimitroulis, "THE RATIONALE FOR TEMPOROMANDIBULAR JOINT SURGERY: A Review Based on a TMJ Surgical Classification," Journal of Oral and Maxillofacial Surgery, Medicine, and Pathology, Nov. 2023, doi: 10.1016/j.ajoms.2023.10.012.

[15] T. Yoda et al., "Clinical guidelines for total temporomandibular joint replacement," The Japanese Dental Science Review, vol. 56, pp. 77–83, Apr. 2020, doi: 10.1016/j.jdsr.2020.03.001.

[16] F. M. Gil et al., "Consensus Report and Recommendations on the Management of Late-stage Internal Derangement of the Temporomandibular Joint," Journal of Clinical Medicine, vol. 13, Jun. 2024, doi: 10.3390/jcm13113319.

[17] M. Mian, M. Woliansky, A. Sklavos, S. Sreedharan, and R. Kumar, "What indication criteria are applied to patients receiving total temporomandibular joint replacement? A systematic review," The Australasian Journal of Oral and Maxillofacial Surgery, Nov. 2025, doi: 10.63717/2025.ms0048.

[18] M. Siewert-Gutowska, R. Pokrowiecki, A. Kamiński, P. J. Zawadzki, and Z. Stopa, "State of the Art in Temporomandibular Joint Arthrocentesis—A Systematic Review," Journal of Clinical Medicine, vol. 12, Jun. 2023, doi: 10.3390/jcm12134439.

[19] M. Derwich, M. Mitus-Kenig, and E. Pawłowska, "Mechanisms of Action and Efficacy of Hyaluronic Acid, Corticosteroids and Platelet-Rich Plasma in the Treatment of Temporomandibular Joint Osteoarthritis—A Systematic Review," International Journal of Molecular Sciences, vol. 22, Jul. 2021, doi:

10.3390/ijms22147405.

[20] S. Nagori, V. Gopalakrishnan, H. Rangarajan, V. Kulkarni, and A. Roychoudhury, "Does intra-articular injection of platelet-rich plasma/platelet-rich fibrin improve outcomes after temporomandibular joint arthrocentesis? A systematic review and meta-analysis." The British journal of oral & maxillofacial surgery, Jun. 2024, doi: 10.1016/j.bjoms.2024.06.007.

[21] J. Li and H. Chen, "Intra-articular injection of platelet-rich plasma vs hyaluronic acid as an adjunct to TMJ arthrocentesis: A systematic review and meta-analysis." Journal of stomatology, oral and maxillofacial surgery, pp. 101676, Nov. 2023, doi: 10.1016/j.jormas.2023.101676.

[22] J. Cheung, S. Aronovich, J. P. Troost, and M. Hakim, "Is Advanced Arthroscopic Debridement in Patients With End-Stage Temporomandibular Joint Degenerative Joint Disease Associated With Improved Quality of Life and Pain Reduction?" Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons, Nov. 2024, doi: 10.1016/j.joms.2024.11.003.

[23] H. Askar, S. Aronovich, B. Christensen, J. McCain, and M. Hakim, "Is Arthroscopic Disk Repositioning Equally Efficacious to Open Disk Repositioning? A Systematic Review." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons, Feb. 2021, doi: 10.1016/j.joms.2021.02.007.

[24] O. Ellis, S. Tocaciu, D. McKenzie, M. McCullough, and G. Dimitroulis, "Risk Factors Associated With Poor Outcomes Following Temporomandibular Joint Discectomy and Fat Graft." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons, May 2021, doi: 10.1016/j.joms.2021.05.018.

[25] C. Hol, P. Mork-Knutsen, T. A. Larheim, T. Bjørnland, and L. Z. Arvidsson, "Temporomandibular Joint Discectomy in Patients With Disc Displacement: Assessment of Osteoarthritis at 10- and 30-Year Follow-Up." Journal of oral rehabilitation, Sep. 2024, doi: 10.1111/joor.13854.

[26] L. González-Pérez et al., "Prospective study of five-year outcomes and postoperative complications after total temporomandibular joint replacement with two stock prosthetic systems." The British journal of oral & maxillofacial surgery, Nov. 2019, doi: 10.1016/j.bjoms.2019.10.312.

[27] E. Bach, N. Sigaux, M. Fauvernier, and A. Cousin, "Reasons for failure of total temporomandibular joint replacement: a systematic review and meta-analysis." International journal of oral and maxillofacial surgery, Jan. 2022, doi: 10.1016/j.ijom.2021.12.012.

[28] F. P. P. Lima et al., "Complications of total temporomandibular joint replacement: a systematic review and meta-analysis." International journal of oral and maxillofacial surgery, Dec. 2022, doi: 10.1016/j.ijom.2022.10.009.

[29] S. Gerber, M. Woliansky, M. Neiva-Sousa, T. Visholm, A. Limacher, and A. Sidebottom, "Complications of temporomandibular joint replacement surgery in adult patients: A systematic review and meta-analysis." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery, Apr. 2025, doi: 10.1016/j.jcms.2025.03.016.