

Comprehensive Review on Arthrocentesis of TMJ

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ABSTRACT

Background: Arthrocentesis, as applied to the TMJ, involves irrigation of the superior joint space for removal of synovial fluid and other elements from the joint¹. It's a minimally invasive chairside procedure and has documented to relieve symptoms. The most widely accepted and classical manner in which this technique is performed is through two-needle access to the superior joint space and it has been reported in the literature that this technique is challenging and has several limitations. ²Thus, the use of a single-puncture approach has been proposed, which represents a less traumatic and more comfortable to perform the technique. The single-puncture approach may have several advantages over the classical two-needle approach in regard to completion time, tolerability, stabilization of the needle, and retention of the intra-articular medication. ²This comprehensive review emphasize on the indications, different methods, various points of insertion, types of lavage solutions, potential complications and their management, contraindications and a technical note on the fabrication of Dual cannula for the Single puncture technique.

Keywords: Arthrocentesis, SPA, DPA, Dual cannula.

INTRODUCTION

Arthrocentesis of Temporomandibular joint refers to lavage of the upper joint space by hydraulic pressure and thereby release of adhesions to improve the motions. It was first described by Nitzan et al. in 1991 to treat an acute closed jaw.¹ It can be performed under local anaesthesia and classified as Single puncture and Double puncture arthrocentesis (Table 1). ³ Double puncture being the conventional technique with multiple drawbacks of the procedure such as multiple puncture site, the greater chance of injury to the vital structures etc. made evolution of Single puncture technique resulted in overcoming these drawbacks.⁴ Multiple methods for dual cannula preparation for single puncture arthrocentesis has been described in literature such as the Shepherds cannula,⁷ IV catheter² etc. but being the most cost-efficient and availability across the Globe made and

easy fabrication in a small dental setup made the 18 or 20 gauge needle usage most acceptable.

Review of literature

Arthrocentesis evolved from greek word (Atheros meaning a joint and kentesis meaning puncture) which refers to the lavage of the upper joint space, creation of hydraulic pressure and manipulation to release adhesions of the disc "anchored disc phenomenon" and improve the range of motions. Indications for TMJ arthrocentesis are listed in Table3. It was first described by Nitzan et al. in 1991 to treat an acute closed lockjaw. This technique is referred to like a simple, minimally invasive, inexpensive and highly efficient procedure. Senturk and Cambazoglu³ have classified the t TMJ arthrocentesis into single and double puncture technique. Double puncture arthrocentesis which is the traditional one, involves insertion of two

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separate needles and was described by Nitzan, Laskin and Alkan . Single puncture arthrocentesis requires the insertion of a single needle or single barrel of the needle which has 2 ports one for inflow and the other for outflow which was described by Alkan , Guarda Nardini, Rahal, Oreoglu and Rehman. Totally as per literature till today, there are 12 techniques for arthrocentesis of which 7 for single puncture and 5 for double puncture procedures. These procedures can be done by blocking the auriculotemporal nerve and the line should be drawn from the tragus to the lateral canthi (Holmlund Hellsing line.)(Figure 3) and according to the plan of the operator for the insertion site the procedure is performed. Different points of insertion of a needle for the procedure (Figure 4) and their pros and cons are listed in

Table 5. The gauge of needle used ranges from 18 – 27. Multiple lavage solutions are described in literature such as Ringer lactate, saline, vit.B12 and saline mix etc. being more physiologically advisable based on numerous studies using cartilage or synovium demonstrated that Ringer lactate is superior to the others.⁶ The volume of lavage solutions described in the literature varies from 50ml to 500 ml.⁵ This is done for the elimination of catabolites present in the synovial fluid.

After the procedure, an intraarticular injection is deposited into the joint space. Multiple pharmacological agents are used for this majority being steroids, glucocorticoid preparations, morphine-based drugs and autologous PRP and blood . No pharmacological agent showed any superiority over the other.⁶

Complications after the procedure are listed in table 2.

Postoperative management of the patient is listed in table 4.

Management of complications is listed in Table 6.

Contraindications for TMJ arthrocentesis are listed in Table 7.

Being most accepted with the highest number of subjects and longer follow up period, Alkan's single puncture technique is widely accepted and followed.

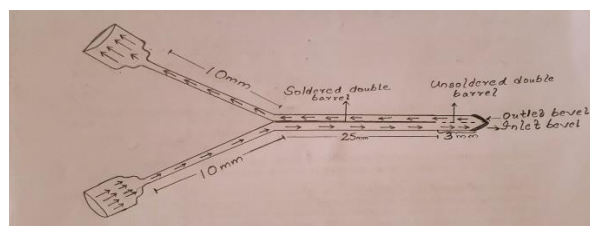


Fig 1: Soldering technique to maintain the accuracy of the exact needle tip and bevel.

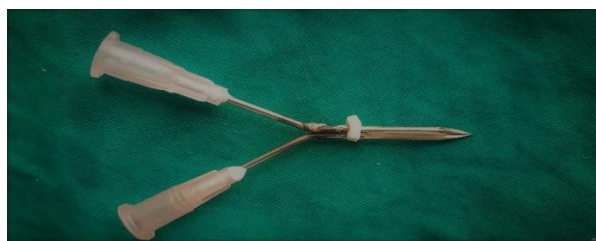


Fig 2: Device fabricated using two 18 gauge (38mm) needles which are soldered 10mm away from the hub and silicon stopper placed at 2cms away from the tip of the needle.



Fig 3: Holmlund Hellsing Line.



Fig 4: Holmlund Hellsing line with different points of insertion of needle.

Point black – 10mm from middle of tragus & 2mm below the canthotragal line

Point yellow – 20mm from middle of tragus and 10mm below the canthotragal line

Point red – 13-14mm from the middle of the tragus and 2mm below canthotragal

Point blue – 7mm from the middle of the tragus and 2mm below it

Table 1: Showing all the studies done earlier.

NITZAN(1991) – POINT BLACK & YELLOW	19GUAGE X 2	RINGER 'S LACTATE 200ML IN 15-20MIN	SIMPLE, MINIMAL INVASIVE, ECONOMIC, HIGHLY EFFECTIVE
LASKIN (1998) – POINT BLACK & RED	20GUAGE X 2	RINGER 'S LACTATE 200ML IN 15-20MIN	EASIER THEN NITZAN'S
ALKAN (2010) – POINT BLACK AND BLUE	21 GUAGE X 2	RINGER 'S LACTATE 200ML IN 15-20MIN	OUTFLOW IS EASIER TO ACHIEVE
DOUBLE PUNCTURE ARTHROCENTESIS WITH AUTOMATIC IRRIGATION	21GUAGE X 2	SALINE 300ML FOR 2MINS	HIGH PRESSURE REMOVES ADHESION
ULTRASONOGRAPHY GUIDED DPA (7MHz, LINEAR PROBE)	20GUAGE X 2	500ML RINGER'S LACTATE	RELIABLE & EASY

Technical note on Dual cannula fabrication for Single Puncture Arthrocentesis

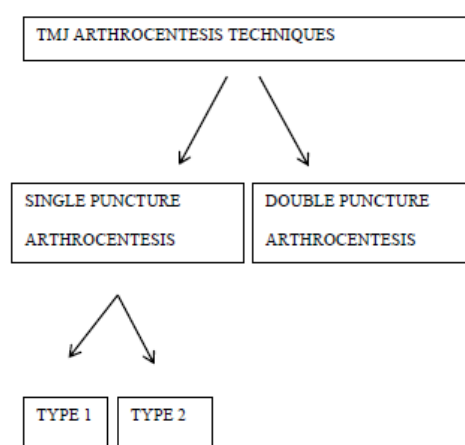
Two 18 or 20 gauge needles of 38mm length which are bend 30 degrees at 10mm from the hub and are soldered from the barrel convergence up to 3 mm short of biangular bevel facing the bevel away from each other. The solder should be kept 3mm away from the needle tip to prevent thermal damage to the needle tip. The effectiveness of irrigation under high pressure (40 KPa) was investigated by comparing arthroscopic findings before and after the irrigation ^{8,9,10} along with the measurement of intracapsular pressure during irrigation. To ensure the ballooning effect with the irrigant before obtaining the outflow, the bevel of the needles were oriented in such a way that the needle tips remain approximating and bevel facing the opposite direction.

A silicone stopper which is placed at 2cms from the barrel tip is used for measuring the depth of insertion. One can be used for inflow and simultaneously the other is the outflow. The point of introduction of the barrel is 10 mm away from the tragus point and 2mm below the line(Holmlund Hellsing line) lavage can be performed in this way.

CONCLUSION

Considering the limitations of the study, we conclude that arthrocentesis is a cost-efficient, simple and relatively safe and cost-efficient procedure. Single puncture arthrocentesis with the

use of dual cannula technique is relatively easy to perform as there is a single port of entry and least injury to the tissues as compared to the double puncture technique and efficient in lavage and is least discomfort to the patient .As the 18 or 20 gauge needles, soldering unit is readily available in every dental setup its found to be more convenient and is less time consuming for the fabrication. Above all, it can provide an alternative to the Shepherds cannula technique and it's more cheaper and readily available. Due to its availability after every use, the device can be discarded. Further studies with more subjects and longer duration are needed to prove the advantages and disadvantages and the proper intraarticular injections and also the efficacy of PRP and PRF injections to the site.



Graph 1: Classification of TMJ arthrocentesis techniques.

Table 2: Potential complications after TMJ arthrocentesis⁶.

Complications after TMJ arthrocentesis
Iatrogenic scuffing
Facial nerve injury
Preauricular hematoma
Injury to superficial temporal artery
Development of arteriovenous fistula
Bleeding into the joint
Intracranial perforation
Serious bradycardia
Breakage of a part of the needle in the joint
Unsuccessful introduction of the needle
Leakage of the lavage fluid into the extra-articular space in the area
Damage to the surface of the joint
Allergic reactions to the local anaesthetic or drugs administered at the end of arthrocentesis
Dizziness
Partial hearing loss

Table 3: Indications for TMJ arthrocentesis.

Indications for TMJ arthrocentesis
Anterior disc displacement with and without reduction
For early adhesions next to fossa and or the upper aspect of articular tubercle
Synovitis
Capsulitis
Painful joint noise occurring during mouth opening and closing
Hemarthrosis due to recent trauma
Recurrent dislocation of the joint

Table 4: Postoperative management.

Ice pack to be applied over the joint for 15 – 20 minutes every hourly for the first 24 hours
Compression dressings are utilized for the first 24-72 hours for hemostasis and to reduce the swelling
Sleeping position 30-degree head for 48 hours
Jaw opening and range of exercises should begin on the day of procedure continued several times for 1 week
Non-chewing soft diet for 15 days

Table 6: Management of complications.

Management of potential complications
Temporary swelling of the preauricular region due to fluid extravasation was resolved in less than 1 day
Bleeding due to injury of the temporal superficial artery was stopped by pressing
Temporary facial paralysis, lingual and inferior alveolar anaesthesia was resolved within 4 hours
Tachycardia was observed during the application of the anaesthetics. Afterwards, the patient healed

Syncope resolved in less than 15 minutes
Severe pain and limitation of mouth opening were resolved in most 5 days

Table 7: Contraindications for TMJ arthrocentesis.

Contraindications for TMJ arthrocentesis
Presence of concomitant facial pain of separate etiologies
Chronic pain disorders
Presence of local or systemic conditions that may interfere with the normal healing process and subsequent tissue homeostasis
Presence of deformity or pathology in TMJ

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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