

UNIVERSIDADE PAULISTA

PROGRAMA DE PÓS GRADUAÇÃO EM ODONTOLOGIA

**AVALIAÇÃO CLÍNICA DO TRATAMENTO DO
DESLOCAMENTO ANTERIOR DO DISCO ARTICULAR DA ATM,
PELA TÉCNICA DE DISCOPEXIA ARTROSCÓPICA
COM SUTURA EM DOIS PONTOS**

Dissertação apresentada ao Programa de Pós-Graduação em Odontologia da Universidade Paulista – UNIP, para obtenção do título de Mestre em Odontologia.

JOSÉ ROBERTO PITERI FILHO

SÃO PAULO

2017

UNIVERSIDADE PAULISTA
PROGRAMA DE PÓS GRADUAÇÃO EM ODONTOLOGIA

**AVALIAÇÃO CLÍNICA DO TRATAMENTO DO
DESLOCAMENTO ANTERIOR DO DISCO ARTICULAR DA ATM,
PELA TÉCNICA DE DISCOPEXIA ARTROSCÓPICA
COM SUTURA EM DOIS PONTOS**

Dissertação apresentada ao Programa de Pós-Graduação em Odontologia da Universidade Paulista – UNIP, para obtenção do título de Mestre em Odontologia.

Orientador: Prof. Dr. Luciano Lauria Dib

JOSÉ ROBERTO PITERI FILHO

SÃO PAULO

2017

Piteri Filho, José Roberto.

Avaliação clínica do tratamento do deslocamento anterior do disco articular da ATM, pela técnica de discopexia artroscópica com sutura em dois pontos / José Roberto Piteri Filho. - 2017.

36 f. : il.

Dissertação de Mestrado Apresentada ao Programa de Pós-Graduação em Odontologia da Universidade Paulista, São Paulo, 2017.

Área de Concentração: Cirurgia Bucomaxilofacial.

Orientador: Prof. Dr. Luciano Lauria Dib.

Coorientador: Prof. Dr. Fábio Ricardo Loureiro Sato

1. Artroscopia. 2. Discopexia. 3. Disfunção temporomandibular. I. Dib, Luciano Lauria (orientador). II. Sato, Fábio Ricardo Loureiro (coorientador). Título.

JOSÉ ROBERTO PITERI FILHO

**AVALIAÇÃO CLÍNICA DO TRATAMENTO DO
DESLOCAMENTO ANTERIOR DO DISCO ARTICULAR DA ATM,
PELA TÉCNICA DE DISCOPEXIA ARTROSCÓPICA
COM SUTURA EM DOIS PONTOS**

Dissertação apresentada ao Programa de Pós-Graduação em Odontologia da Universidade Paulista – UNIP, para obtenção do título de Mestre em Odontologia.

Aprovado em: _____

BANCA EXAMINADORA

_____ / /

Prof. Dr. Luciano Lauria Dib

_____ / /

Prof. Dr. Alfredo Mikail Melo Mesquita

_____ / /

Prof. Dr. Fábio Ricardo Loureiro Sato

DEDICATÓRIA

Dedico este trabalho a minha família, que sempre me deu muito amor, carinho e apoio em todos os momentos de minha vida e, principalmente, aos meus pais que, com muito esforço, deram-me a oportunidade de me formar cirurgião-dentista. Dedico também a minha esposa por ser forte companheira em tudo e pela paciência, compreensão e carinho que teve comigo durante o processo do mestrado.

AGRADECIMENTOS

Agradeço primeiramente a Deus por todas as promessas que tem feito em minha vida e por nunca ter me dado uma vitória sem antes confirmar pela sua palavra.

Agradeço à Universidade Paulista, UNIP, por me dar a oportunidade de realizar o sonho do mestrado.

Agradeço ao Dr. Gustavo Tralli e ao Dr. Fábio Sato, por me darem a oportunidade de aprender artroscopia da ATM e por toda a colaboração neste trabalho.

Agradeço imensamente a meu orientador, Prof. Dr. Luciano Lauria Dib, por toda paciência, orientação, aprendizado e inspiração. Com certeza, sua presença contribuiu muito para minha vida profissional.

Agradeço à Dra. Liana Christine Hiromi Ono pela ajuda com o levantamento dos dados desta pesquisa.

Agradeço ao Prof. Frederico Molina Cohrs, pela ajuda na análise estatística da pesquisa e por transmitir tanto conhecimento.

Agradeço aos meus familiares e à minha esposa pela paciência nos momentos de estresse e de ausência.

Agradeço aos pacientes.

RESUMO

Objetivo: Avaliar o resultado do tratamento de DTM pela da técnica de discopexia artroscópica com fixação em dois pontos do disco articular da ATM por meio de dados pertinentes à sintomatologia clínica dolorosa, à máxima abertura bucal e à presença de ruídos articulares.

Material e métodos: Prontuários de pacientes portadores de DTM com deslocamento anterior do disco articular, que foram submetidos a essa técnica. Os dados foram coletados a partir de fichas previamente confeccionadas para obter as informações, que foram aplicadas 1 dia antes da cirurgia, 7 dias, 30 dias e 180 dias de pós-operatório.

Resultados: Total de 45 pacientes (60 ATMs), com idade média de 28 anos (desvio padrão 8,6), sendo 36 (80%) do gênero feminino e 9 (20%) do gênero masculino. Houve melhora média de 8 pontos da escala visual analógica (EVA 0-10) para dor (EVA $0\pm 1,5$) e de 6mm para máxima abertura bucal (MAB $39\text{mm}\pm 6,1$). A ausência de ruídos articulares subiu de 17,7% para 82,2%.

Conclusão: Durante o período de acompanhamento de seis meses pós-operatório, a discopexia artroscópica com fixação em dois pontos do disco articular no tratamento de pacientes com distúrbios internos e sintomáticos da ATM mostrou-se efetiva para melhora de dor, máxima abertura bucal e ruídos articulares. Não houve diferença estatística para os resultados em relação aos estágios de Wilkes.

Palavras chave: Artroscopia, Discopexia, Disfunção Temporomandibular

SUMÁRIO

1 INTRODUÇÃO.....	7
2 ARTIGO	10
3 CONCLUSÃO GERAL	34
REFERÊNCIAS BIBLIOGRÁFICAS.....	35

1 INTRODUÇÃO

A Disfunção da Articulação Temporomandibular (DTM) abrange uma série de problemas clínicos que envolvem os músculos da mastigação e a articulação temporomandibular (ATM)¹.

O sintoma mais importante que caracteriza a DTM e leva a maioria dos pacientes a procurar tratamento é a dor, embora outros sinais clínicos também possam estar presentes, como estalidos, crepitações, limitação e assimetria dos movimentos mandibulares².

Embora se estime a prevalência de problemas de ATM em até 76% da população, apenas de 20% a 30% apresenta sintomatologia, que se mostra mais prevalente em pacientes do gênero feminino, entre 20 e 40 anos^{3,4,5}.

Não há etiologia comprovada para os diversos sintomas das DTMs. Ainda assim, atividades parafuncionais, fatores hormonais, estresse, problemas psicológicos, trauma, processos degenerativos, artrite, luxação recorrente da mandíbula e deslocamento anterior do disco (DAD) são citados como possíveis causas^{6,7,8}.

O papel do DAD, nas DTMs, ainda é controverso e há dúvidas se desempenha papel primário ou secundário em sua etiologia⁹. Entretanto, estudos indicam que sua prevalência em pacientes com dor nas articulações é de 77% a 94%¹⁰.

Inicialmente, recomendam-se terapias não invasivas. Cerca de aproximadamente 90% dos pacientes alcançam resultado satisfatório no tratamento conservador das disfunções, quando submetidos ao protocolo, que consiste na associação de placa de mordida, fisioterapia, acupuntura, acompanhamento psicológico, utilização de medicamentos anti-inflamatórios não esteroidais (AINE) e miorrelaxantes^{11,12,13}.

Aproximadamente 10% dos pacientes com DTM intra-articular não obtêm resultado satisfatório com o tratamento conservador, gerando indicação cirúrgica da ATM como tentativa de melhora da sintomatologia da DTM¹⁴.

Desde que Wilkes usou a artrografia, para descrever a anatomia, forma e função da ATM, a cirurgia de reposicionamento do disco articular tornou-se uma técnica aceita¹⁵.

A margem de sucesso da cirurgia aberta de ATM varia entre 77% e 100% em relação à amplitude de movimentos e redução de dor¹⁶.

Atualmente, a artroscopia tem sido mais indicada, pois, além de ser minimamente invasiva, apresenta baixa taxa de complicações trans e pós-operatórias e tempo reduzido de internação hospitalar, quando em relação à cirurgia aberta^{17,18}.

O procedimento padrão envolve artroscopia de lise e lavagem (ALL) no espaço supra-articular. Procedimentos mais avançados, denominados artroscopia operatória (AO), incluem capsulotomia, debridamento, eletrocauterização do tecido retrodiscal e reposicionamento do disco articular (discopexia)^{19,20}.

Por ser minimamente invasiva, a artroscopia permite atuar diretamente nos tecidos doentes, mas preservando os tecidos adjacentes saudáveis da ATM. Sinovites, adesões, mobilização e reposição do disco articular podem ser tratados com essa técnica, com melhora significativa da movimentação mandibular e do sintoma de dor²¹.

Com relação às técnicas de discopexia artroscópica, Tarro (1989)²² descreveu a técnica com sutura cega do disco articular e fixação do fio no conduto auditivo. Já Israel (1989)²³ descreveu a passagem de uma agulha inferosuperiormente, do espaço infradiscal para o supradiscal, enquanto McCain et al. (1992)¹⁹ desenvolveram, mais tarde, uma técnica semelhante.

Adame e Munhoz-Guerra (2012)²⁴ descreveram uma técnica de discopexia artroscópica em que o disco é fixado em dois pontos. Introduzida através do espaço supra-articular, a agulha transpassa para o espaço infra-articular lateralmente e retorna ao espaço supra-articular medialmente. Segundo o autor, essa técnica promove uma tração maior do disco para região posterolateral da cápsula articular, o que, além de mais seguro em relação à posição do disco, a cabeça do côndilo e a fossa mandibular, propiciaria melhora nas condições mecânicas da ATM, no quadro de dor e daria suporte para a reparação dos tecidos.

O trabalho inicial de Adame²⁴ reporta apenas 13 pacientes, com total de 16 articulações, o que é considerado pouco em relação a outros autores. Até o momento, não existem outros trabalhos que comprovem a eficácia dessa técnica no que diz respeito à melhora clínica.

Portanto, o objetivo do presente estudo consiste em avaliar os resultados da técnica de discopexia artroscópica com fixação em dois pontos por meio de análise

retrospectiva de prontuários de casos tratados, com essa técnica, pela mesma equipe, no período entre 2014 e 2016. Foram avaliados os dados pré e pós-operatórios a respeito de sintomatologia clínica dolorosa, abertura bucal em milímetros e presença de ruídos articulares, correlacionados com estágios de Wilkes.

2 ARTIGO

CLINICAL EVALUATION OF THE TREATMENT OF ANTERIOR DISC DISPLACEMENT OF THE TEMPOROMANDIBULAR JOINT, BY ARTHROSCOPIC DISCOPEXY WITH SUTURE IN TWO POINTS

ABSTRACT

Objective: To evaluate the results of treatment of TMD by the arthroscopic discopexy technique, with two-point fixation of the TMJ disc, by means of data pertinent to painful clinical symptomatology, maximum mouth opening and presence of joint noises. **Material and Methods:** Medical records of patients suffering from TMD with anterior disc displacement who have undergone arthroscopic discopexy with two-point fixation of the articular disc. The data were collected through previously prepared forms to obtain information that were conducted 1 day before the surgery, and at 7 days, 30 days and 180 days postoperatively.

Results: Total of 45 patients (60 TMJs), with an average age of 28 years (standard deviation 8.6), 36 (80%) of them being female patients and 9 (20%) being male patients. There was an average improvement of 8 points on the visual analogue scale (VAS 0-10) for pain (VAS 0 ± 1.5). Average improvement of 6mm for maximum mouth opening (MMO $39\text{mm}\pm 6.1$). Absence of joint noises went from 17.7% to 82.2%.

Conclusion: Arthroscopic discopexy with two-point fixation of the articular disc proved to be effective for the treatment of patients with internal and symptomatic TMJ disorders with regard to the improvement of pain, maximum mouth opening and joint noises in the sixth month postoperative follow-up period.

No statistical difference was observed in the results with regard to Wilkes' stages.

Keywords: Arthroscopy, Discopexy, Temporomandibular Dysfunction

CONTENTS

1	INTRODUCTION.....	12
2	OBJECTIVE.....	Erro! Indicador não definido.
3	MATERIAL AND METHODS.....	14
	3.1 Material.....	14
	3.2 Methods.....	14
	3.3 Surgical Technique.....	16
4	RESULTS	17
5	DISCUSSION.....	20
6	CONCLUSION	23
	BIBLIOGRAPHICAL REFERENCES	24
7	APPENDICES.....	27

1 INTRODUCTION

Temporomandibular joint dysfunction (TMD) is a comprehensive term that covers a series of clinical problems involving the muscles of mastication and the temporomandibular joint (TMJ)¹. Pain is the most important symptom of TMD and it is for this reason that most patients seek treatment. Other clinical signs may be present, such as clicking, crepitation, limitation and asymmetry of mandibular movements².

It is estimated that TMJ problems may be prevalent in up to 76% of the population, but only 20 to 30% present symptoms, this being more prevalent in female patients aged 20-40^{3,4,5}.

There is no proven aetiology for the various TMD symptoms, however, parafunctional activity, hormonal factors, stress, psychological conditions, trauma, degenerative processes, arthritis, recurrent dislocation of the jaw and anterior disc displacement (ADD) are cited as possible causes^{6,7,8}.

The role of ADD in TMD is still controversial, there is no proving and there are doubts as to whether it plays a primary or secondary role in its etiology⁹. However, studies indicate that the prevalence of ADD in patients with joint pain is 77-94%¹⁰.

Initially non-invasive therapies are recommended for the treatment of TMD. Approximately 90% of the patients achieve satisfactory results with conservative treatment of the dysfunction, when undergoing protocol that consists of combining occlusal splint, physiotherapy, acupuncture, psychological counselling, nonsteroidal anti-inflammatory drugs (NSAID) and myorelaxants^{11,12,13}.

Approximately 10% of patients with internal derangement of TMD do not obtain a satisfactory result from conservative treatment, thus generating a surgical indication for the TMJ as an attempt to improve the TMD symptomatology¹⁴.

Ever since Wilkes used arthrography to describe the anatomy, shape and function of the TMJ, articular disc repositioning surgery has become an accepted technique¹⁵.

The margin of success for open TMJ surgery varies between 77 and 100% with regard to widening the range of motion and pain reduction¹⁶.

At the moment, arthroscopy is increasingly being indicated, since aside from being minimally invasive, it has a low rate of trans and postoperative complications, and is associated with a shorter hospital stay compared to open surgery^{17,18}.

The standard procedure involves arthroscopic lysis and lavage (ALL) in the supra-articular space. More advanced procedures called operative arthroscopy (OA) include capsulotomy, debridement, electrocautery of retrodiscal tissue, and suture of the articular disc (discopexy)^{19,20}.

Arthroscopy allows to act directly on diseased tissues, thus preserving adjacent healthy tissues of the TMJ. Synovitis, adhesions, mobilization and repositioning of the articular disc can be treated by means of this minimally invasive technique, resulting in significant improvement in mandibular movements and pain symptoms²¹.

With regard to arthroscopic discopexy techniques, Tarro (1989)²² has described the technique as blind suture of the articular disc and fixation of the wire in the auditory canal. Israel (1989)²³ has described passing a needle in the lower-upper direction from the lower joint space to the upper joint space, and McCain et al. (1992)¹⁹ developed a similar technique later.

Adame and Munhoz-Guerra (2012)²⁴ have described an arthroscopic discopexy technique in which the disc is fixed at two points, where the needle is introduced through the upper joint space, passes into the lower joint space laterally and returns to the upper joint space medially. According to the author, this technique promotes greater traction of the disc toward the posterolateral region of the articular capsule, which would be safer with regard to the position of the disc, the condylar head and the mandibular fossa, thus improving the mechanical conditions of the TMJ, reducing pain and aiding with tissue repair.

Adame's initial study²⁴ reports only on 13 patients with a total of 16 joints, which is considered few, in comparison to the other authors. As yet, there are no other studies that prove the efficacy of this technique in terms of clinical improvement.

Therefore, the objective of this study is to evaluate the results of the arthroscopic discopexy technique with two-point fixation, through retrospective analysis of case reports of patients who underwent this technique by the same surgical team between 2014 and 2016. Pre and postoperative data were evaluated with respect to painful clinical symptoms, mouth opening in millimeters, and presence of joint noises, correlated with Wilkes' stages.

2 MATERIAL AND METHODS

2.1 Material

Medical records of patients diagnosed from TMD, treated by the same team at a private practice in the city of Mogi das Cruzes, from 2014 to 2016, who underwent arthroscopic discopexy with two-point fixation of the articular disc.

Study approved by the ethics and research committee of the Paulista University (**Certificate of Presentation for Ethical Evaluation: 59154916.7.0000.5512**).

Inclusion Criteria

- 1) Patients with internal TMJ derangement with anterior disc displacement (ADD) confirmed by magnetic resonance imaging (MRI).
- 2) Patients who did not show satisfactory progress with conservative TMD treatment with or without the aid of occlusal splint, physical therapy, acupuncture, nonsteroidal anti-inflammatory drugs and myorelaxants.
- 3) Patients without previous history of TMJ surgery.
- 4) Patients who exclusively underwent arthroscopic discopexy with two-point fixation of the articular disc.
- 5) Patients who presented medical records with precise information regarding painful symptoms, mouth opening movements and joint noises.

2.2 Methods

The data were collected from medical records, through pre-prepared forms to obtain pre- and postoperative information that were collected at 4 different moments, as follows:

- 1) Preoperative, data obtained 1 day before surgery;
- 2) 7 days postoperative, data collected 7 days after surgery;
- 3) 30 days postoperative, data collected 1 month after surgery;
- 4) 180 days postoperative, data collected 6 months after surgery.

The forms prepared collected the data already reported in the medical records, as well as by the patients, the attending surgeon and the magnetic resonance imaging (MRI) report.

The symptomatology was measured by means of subjective and objective questions that aim to standardise information concerning painful processes, limitation of mouth opening and joint noises as answered by the patients.

Visual analogue scale (VAS) was used to measure pain and objective questions were asked regarding other symptoms. The VAS has a range of 0 to 10, with 0 meaning no pain, between 1 and 3 classified as mild pain, between 4 and 7 as moderate pain and between 8 and 10 as severe pain.

The data with regard to the maximum mouth opening (MMO), measured in millimetres (mm), were collected directly by the surgeon with a pachymeter between the incisal edges of the anterior maxillary and mandibular incisors. For edentulous patients, MMO was measured between the alveolar borders instead of the incisal edges.

The data on joint noises (JN) were collected through professional palpation and auscultation at all times.

For the statistical analysis, an $\alpha = 0.05$ was used as a reference to demonstrate the significance of the technique. Distribution of categorical and numerical data was done at all times.

For the numerical data regarding the VAS and the MMO, the quartiles, elements of central tendency and dispersion were calculated. Also, data distributions were evaluated to determine which statistical analysis would be the most appropriate. To assess normality, the Shapiro-Wilk test was used, as the number of cases was less than 2,000. Absolute and relative frequencies (n and %) were used for the presentation of the categorical data regarding JN.

The VAS variable presented a non-normal distribution. The option was to use the Wilcoxon test to compare the groups.

The variable was found to follow a normal distribution, as in the case of the MMO variable, which was followed up on to evaluate the difference between the standard deviations. Equal standard deviations of the groups were compared using the *Student's* t-test. For different standard deviations, using the Analysis of Variance (ANOVA) test was indicated.

In case of categorical variables, such as JN, the chi-square test was used.

The variables were analysed in a general manner at each moment, separated into unilateral and bilateral groups, and separated into groups with respect to Wilkes' stages.

Wilkes' stages were classified by means of MRI images and were divided into groups according to each respective stage.

2.3 Surgical Technique

Under a general anesthesia the surgical procedures consisted of initial arthrocentesis with 100mL of Ringer's lactate to expand the upper joint space, eliminate any adhesions, free radicals and chemical metabolites of the inflammatory process. Access from the first portal to introduce a 2.3mm scope (LINVATEC®), followed by arthroscopic sweep. Preparation of the second access portal for triangulation, capsulotomy in anterolateral recess, electrocauterisation of synovitis in the retrodiscal zone with a dissecting long tip. The discopexy needle was inserted in the same triangulation portal and after discopexy at two points of the articular disc. Access was made from the third portal to capture the suture thread (PDS 2.0). After capturing the thread, the wire was connected to the optical and suture access portal for fixing posterior traction of the articular disc and suturing the skin. Figures 1 and 2 show the pre and 6 month of postoperative magnetic resonance images of the same patient, confirming the reduction of the articular disc after the procedure.

3 RESULTS

During the study period, 45 patients were operated on by the same team. Of these, 15 (33.3%) underwent surgery on the right side, 15 (33.3%) underwent surgery on the left side, and 15 (33.3%) underwent bilateral TMJ surgeries, totalling 60 TMJs operated on. The average age was 28 (standard deviation 8.6), with 36 (80%) being female patients and 9 (20%) male patients. The classification of Wilkes' stages through magnetic resonance imaging (MRI) showed that 24 (53%) patients had stage II, 20 (44%) patients had stage III and 1 patient (2%) had stage IV.

With regard to the pain variable, the data in Table 1 show that 7 days after surgery there was an average improvement of 5 points, thus changing the degree of pain from severe to mild in the first week of the postoperative period. From the preoperative period to the 180th postoperative day, there was an average improvement of 8 points, which indicates that the patients, on average, presented no pain 6 months after surgery. These results concluded that there were significant statistical changes in the pain factor with the technique employed.

With regard to the pain variable and Wilkes' stages II, III and IV, the data presented in Table 2 demonstrates that improvement was observed at all moments studied. Even though the stages studied did not show statistically significant changes between them, it was observed that the average pain for Wilkes stage IV was the least decreased, with a decrease of only 3 points.

With regard to the unilateral and bilateral surgery groups and the pain variable, Table 3 presents similar VAS results at all periods studied. There were no differences between the groups.

Regarding the maximum mouth opening variable (MMO), Table 1 shows that at 7 days postoperative there was a statistical difference and an average decrease of 6mm in mouth opening in relation to the preoperative period, which is normal due to surgical manipulation. Between the preoperative period and 30 days postoperative, there was no statistical difference, and the average mouth opening was the same. Between the preoperative period and 180 days postoperative, there was a statistical difference and an average increase of 6mm in mouth opening was found, which proves that the technique used was statistically significant for increased mouth opening.

For the MMO variable and Wilkes' stages shown in Table 2, we can state that there was a statistically significant improvement in Wilkes' stages II, III and IV between the preoperative period and the 180-day postoperative period. Even though there was no statistical difference in average MMO between Wilkes' stages 180 days after surgery, it was observed that patients in the Wilkes II group had an average of 5.5mm more in MMO than Wilkes III and IV patients.

For the MMO variable, the patients in the unilateral group, shown in Table 3, presented a statistically significant average improvement of 7mm between the preoperative and 180-days postoperative periods. On the other hand, the patients in the bilateral group had a higher average MMO than those in the unilateral group during the preoperative period, and did not present a statistical difference regarding mouth opening after 180 postoperative days, maintaining similar MMO between these two periods. The data demonstrate that discopexy by two-point fixation of the articular disc did not lead to significant improvement for mouth opening in the cases in which the surgery was performed bilaterally.

Even though the patient with Wilkes IV classification has presented less expressive pain reduction results in relation to other stages of Wilkes, the patient presented the highest increase in MMO between the preoperative period and 180 days after surgery.

Regarding the joint noises variable, Table 1 shows that at the preoperative period JN was present in 37 (82.2%) patients. At 7 days postoperative, only 1 (2.2%) patient was found to have JN. At 30 days postoperative, 2 (4.4%) patients presented JN. At 180 days postoperative, only 6 (13.3%) patients were positive for JN. Statistical results confirmed that there was a statistical difference at all times in the postoperative period with regard to the presence of JN obtained by the discopexy technique with two-point fixation of the articular disc.

With regard to the JN variable, Table 2 demonstrates that patients with Wilkes stage II were the ones that best correlated with the absence of JN, with 22 being JN positive at the preoperative period and only 1 patient presenting JN 180 days after surgery. As for Wilkes III patients, 14 were JN positive at the preoperative period and 4 patients were JN positive 180 days after surgery. With regard to the Wilkes IV patient, JN were absent only up to the first week and the first postoperative month, but 180 days after the surgery JN recurred. These data demonstrate that discopexy by two-point fixation of the articular disc resulted in statistically significant

improvement for patients with Wilkes stage II and III, but did not present statistical significance regarding JN for the Wilkes IV patient, although a small number.

With regard to the JN variable, the decrease was statistically significant in both groups in relation to the preoperative period and 180 days postoperative. The unilateral surgery group presented twice as many patients with JN compared to the bilateral surgery group 6 months after surgery, however, there was no statistical difference between the groups with regard to JN.

4 DISCUSSION

In view of the favourable results of the study by Adame and Munhoz-Guerra (2012),²⁴ the authors started using the arthroscopic discopexy technique by two-point fixation of the articular disc, during the period of 2014 to 2016, for the treatment of patients with internal and symptomatic TMJ derangement. This study presents results with regard to the clinical variation of important variables such as pain, mouth opening and joint noises.

The results of this study have shown that after 6 months of postoperative follow-up, there was an average increase of 6mm in maximum mouth opening, a significant average decrease of 8 points on the visual analogue pain scale, and absence of articular noises in 82.2% of the patients.

These data suggest the efficacy of the discopexy technique with two-point fixation for the treatment of internal TMJ derangement, with regard to the clinical improvement of painful symptomatology, mouth opening and joint noises.

According to American Association of Oral and Maxillofacial Surgeons' criteria for success in operative arthroscopy²⁵, modified by Erikki and Westesson²⁶, which consider the technique successful when the VAS score is < 20 (0-100) and the MMO is \geq 35mm, the technique used was, hence, successful.

The results of the pain variable shown in this study are similar to the results of Adame and Munhoz-Guerra (2012)²⁴ initial study regarding discopexy of the articular disc with two-point fixation, the results of the discopexy technique using resorbable pins subsequently presented by Adame et al (2014)²⁷, as well as the clinical results obtained by the same discopexy technique by resorbable pins subsequently presented by Martín-Granizo and Millón-Cruz (2016)²⁸.

When evaluating the pain results with regard to Wilkes stages II, III and IV, it can be concluded that the technique employed is statistically effective in reducing pain at all times studied. Although there was no statistical difference between them regarding this variable, it was observed that pain reduction was lower for the patient with Wilkes stage IV in relation to the patients with Wilkes stage II and III.

With regard to the unilateral and bilateral surgery groups, improvement in pain was statistically significant at all times for both groups, and there was no statistical difference between them.

The results of the MMO variable shown in this study are similar to the results of Adame and Munhoz-Guerra (2012)²⁴ initial study regarding discopexy of the articular disc with two-point fixation, the results of the discopexy technique using resorbable pins subsequently presented by Adame et al (2014)²⁷, as well as the clinical results obtained by the same discopexy technique by resorbable pins subsequently presented by Martín-Granizo and Millón-Cruz (2016)²⁸.

González-García and Rodríguez-Campo (2011)²⁹ showed good results regarding ALL and operative arthroscopy. However, with regard to the MMO variable in relation to Wilkes' stages, only the Wilkes IV group showed a statistically significant improvement, whereas Wilkes II, III and V groups did not present significant statistical changes after the surgery at any moment.

The data obtained in this study regarding Wilkes' stages II, III and IV concluded that the increase in mouth opening was statistically significant for all stages 6 months after surgery. Even though there was no statistical difference between the stages studied, the Wilkes II group presented higher MMO values, while the Wilkes III and IV groups have obtained lower values yet showed similar results.

With regard to the unilateral and bilateral surgery groups, the MMO variable showed statistically significant improvement for the unilateral surgery group 6 months after surgery. The bilateral surgery group did not present a statistical difference, but the average MMO was significantly higher during the preoperative period in the bilateral group in relation to the unilateral group.

When evaluating the results of the JN variable with regard to Wilkes' stages, one can conclude that the technique employed is statistically effective in reducing joint noises for the stages studied at all evaluated moments. Although there is no statistical difference between the groups, it can be stated that the lower the stage of Wilkes, the greater the chances of eliminating JN with the technique employed.

In Brazil, the arthroscopic discopexy technique with two-point fixation has been used since 2013, since the advantages such as direct vision of the needle throughout the discopexy, absence of damage to the surface of the condylar head, avoiding possible late degenerative changes, and the possibility of observing the posterior traction of the articular disc by the end of the discopexy have favoured this technique as opposed to other techniques.

The parameters for pain and mouth opening movements are the most important ones for a patient with TMD. For this reason, the good results of this study

show that the patients treated by this procedure showed improvement in the parameters evaluated, as well as an increase in MMO and decrease in pain in all cases. Articular noises decreased significantly.

No patient had a serious postoperative complication and no case required further surgery.

These data have concluded that the technique evaluated in this study presented good clinical results pertinent to the variables studied. Therefore, we conclude that it is a technique that is effective and can be indicated for the treatment of clinical symptomatology of the TMJ.

5 CONCLUSION

Arthroscopic discopexy technique by two-point fixation of the joint disc for the treatment of patients with internal and symptomatic derangement of the TMJ, was shown to be effective resulting in significant improvement in painful symptoms, mouth opening movements and joint noises in a period of 6 months for patients with Wilkes stage II, III and IV.

Long-term follow-up studies involving a larger number of patients, preoperative and postoperative imaging tests that demonstrate the normal position of the disc.

BIBLIOGRAPHICAL REFERENCES

- 1 Okeson JP. American Academy of Orofacial Pain. Orofacial Pain: Guidelines for Assessment, Diagnosis, and Management. 3rd ed. Chicago: Quintessence Publishing; 1996.
- 2 Dimitroulis G. Temporomandibular disorders: a clinical update. *Br Med J*. 1998;317(7152):190-4.
- 3 Shi Z, Guo C, Awad M. Hyaluronate for temporomandibular joint disorders. *Cochrane Database Syst Rev*. 2003;(1):CD002970.
- 4 Luther F, Layton S, McDonald F. Orthodontics for treating temporomandibular joint(TMJ) disorders. *Cochrane Database Syst. Rev*. 2010; (7), CD006541.
- 5 Suenaga S, Abeyama K, Indo H, Shigeta K, Noikura T. Temporomandibular disorders: MR assessment of inflammatory changes in the posterior disk attachment during the menstrual cycle. *J Comput Assist Tomogr*. 2001; 25:476–481.
- 6 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.
- 7 Tasaki M, Westesson P, Isberg A, Ren Y, Tallents R. Classification and prevalence of temporomandibular joint disk displacement in patients and symptom-free volunteers. *Am J Orthod Dentofacial Orthop*. 1996;109(3):249–262.
- 8 Mujakperuo HR, Watson M, Morrison R, Macfarlane TV. Pharmacological interventions for pain in patients with temporomandibular disorders. *Cochrane Database Syst Rev*. 2010 Oct 6;(10):CD004715.
- 9 Goss AN. Toward an international consensus on temporomandibular joint surgery. Report of the second international consensus meeting, April 1992, Buenos Aires, Argentina. *Int J Oral Maxillofac Surg*. 1993; 22(2):78-81.
- 10 Ribeiro RF, Tallents RH, Katzberg RW, Murphy WC, Moss ME, Magalhaes AC, et al. The prevalence of disc displacement in symptomatic and asymptomatic volunteers aged 6 to 25 years. *J Orofac Pain*. 1997;11:37–47.
- 11 Chung SC, Kim HS. The effect of the stabilization splint on the TMJ closed lock. *JCrano- mandibular Pract*. 1993;11:95-101.
- 12 Mongini F, Ibertis F, Manfredi A. Long-term results in patients with disc displacement without reduction treated conservatively. *Cranio*. 1996 Oct;14(4):301.
- 13 Orlando B, Manfredini D, Salvetti G, Bosco M. Evaluation of the effectiveness of biobehavioral therapy in the treatment of temporomandibular disorders: a literature review. *Behav Med*. 2007; 33(3):101-118.

- 14 Randolph CS, Greene CS, Moretti R, et al. Conservative management of temporomandibular disorders: A posttreatment comparison between patients from a university clinic and from private practice. *Am J Orthod Dentofac Orthop.* 1990; 98(1):77-82.
- 15 Wilkes CH. Structural and functional alterations of the temporomandibular joint. *Northwest Dent.* 1978;57:287-294.
- 16 Walker RV, Kalamchi S. A surgical technique for management of internal derangement of the temporomandibular joint. *J Oral Maxillofac Surg.* 1987;45:299.
- 17 Politi M, Sembronio S, Robiony M, Costa F, Toro C, Undt G. High condylectomy and disc repositioning compared to arthroscopic lysis, lavage, and capsular stretch for the treatment of chronic closed lock of the temporomandibular joint. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2007 Jan;103(1):27-33. Epub 2006 Jul 27.
- 18 Undt G, Murakami K, Rasse M, Ewers R: Open versus arthroscopic surgery for internal derangement of the temporomandibular joint: A retrospective study comparing two centres' results using the Jaw Pain and Function Questionnaire. *J Craniomaxillofac Surg.* 2006; 34:234-241.
- 19 Smolka W, Iizuka T. Arthroscopic lysis and lavage in different stages of internal derangement of the temporomandibular joint: Correlation of preoperative staging to arthroscopic findings and treatment outcome. *J Oral Maxillofac Surg.* 2005 Apr; 63(4):471-478.
- 20 McCain JP, Sanders B, Koslin MG, Quinn JH, Peters PB. Temporomandibular joint arthroscopy: a 6-year multicenter retrospective study of 4,831 joints. *J Oral Maxillofac Surg.* 1992;50(9):926-930.
- 21 Israel HA, Langevin CJ, Singer MD, Behrman DA. The relationship between temporomandibular joint synovitis and adhesions: Pathogenic mechanisms and clinical implications for surgical management. *J Oral Maxillofac Surg.* 2006 Jul;64(7):1066-1070.
- 22 Tarro AW. Arthroscopic treatment of anterior disc displacement: a preliminary report. *J Oral Maxillofac Surg.* 1989 Apr; 47(4):353-358.
- 23 Israel HA. Technique for placement of a discal traction suture during temporomandibular joint arthroscopy. *J Oral Maxillofac. Surg.* 1989; 47:311e313.
- 24 Goizueta Adame CC, Muñoz-Guerra MF. The posterior double pass suture in repositioning of the temporomandibular disc during arthroscopic surgery: A report of 16 cases. *J Cranio Maxillofac Surg.* 2012; 40(1):86.
- 25 Dolwick MF, Reid S, Sanders B, et al. 1984 Criteria for TMJ Meniscus Surgery. Chicago, IL. American Association of Oral and Maxillofacial Surgeons, 1984:31.
- 26 Eriksson L, Westesson PL. Temporomandibular joint discectomy. No positive effect of temporary silicone implant in a 5-year follow-up. *Oral Surg Oral Med Oral Pathol.* 1992; 74:259-272.

27 Goizueta-Adame CC, Pastor-Zuazaga D, Orts Bañón JE. Arthroscopic disc fixation to the condylar head. Use of resorbable pins for internal derangement of the temporomandibular joint (stage II–IV). Preliminary report of 34 joints. *J Craniomaxillofac Surg.* 2014 Jun; 42(4):340-6. doi: 10.1016/j.jcms.2013.05.023. Epub 2013 Jul 3.

28 Martín-Granizo R, Millón-Cruz A. Discopexy using resorbable pins in temporomandibular joint arthroscopy: Clinical and magnetic resonance imaging medium-term results. *J Craniomaxillofac Surg.* 2016 Apr; 44(4):479-86. DOI: 10.1016/j.jcms.2016.01.007. Epub 2016 Jan 18.

29 González-García R, Rodríguez-Campo FJ. Arthroscopic lysis and lavage versus operative arthroscopy in the outcome of temporomandibular joint internal derangement: a comparative study based on Wilkes stages. *J Oral Maxillofac Surg.* 2011;69:2513-24.

6 APPENDICES

Figure 1 - Magnetic resonance imaging before arthroscopic discopexy surgery with two-point fixation of the articular disc (Author's Image).

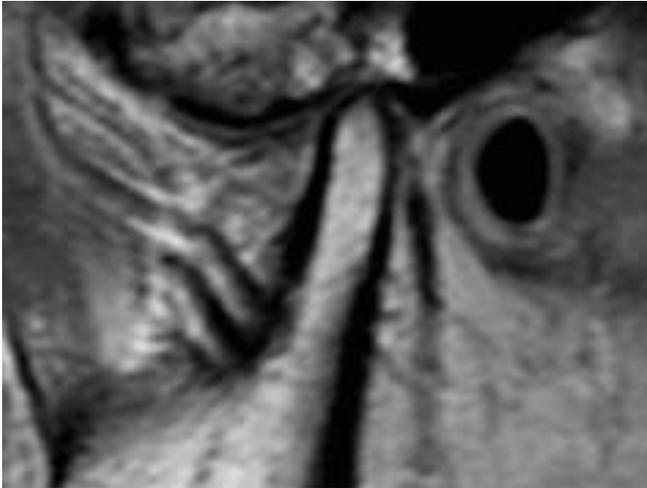


Figure 2 - Magnetic resonance imaging of the same patient, post arthroscopic discopexy surgery with two-point fixation of the articular disc (Author's image).

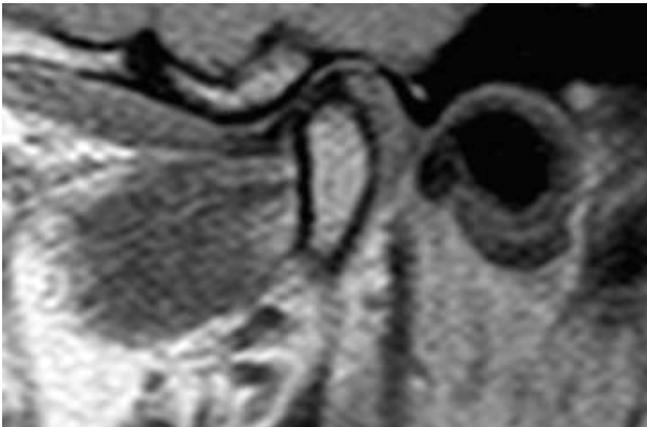


Table 1: Evolutionary assessment of pain variables, measured by the VAS category (0-10); mouth opening, measured by MMO category in mm, and presence of different joint noises at each respective moment.

Variable	Category	Moments			
		Preoperative	7 days PO	30 days PO	180 days PO
PAIN	VAS (mean ± SD)	8±2.4	3±2.3	1±1.7	0±1.5
<i>P</i> Value			<.001*	<0.001*	<.001*
MOUTH OPENING	MMO (mean ± SD)	33±8.4	27±7.2	33±6.7	39±6.1
<i>P</i> Value			<.001‡	0.96‡	<0.001‡
JOINT NOISES	Presence (n/%)	37/82.2	1/2.22	2/4.44	6/13.3
<i>P</i> Value			<.001İ	<.001İ	<.001İ

Abbreviations: PO, postoperative; VAS, visual analogue scale; MMO, maximum mouth opening; SD, standard deviation; n, number of people; mm, millimetres, and *P*, value of statistical significance <.05

* Paired Wilcoxon test

‡ *Student's* t-test

İ Chi-square test

Table 2: Assessment of the pain variable, maximum mouth opening and joint noises, with respect to Wilkes' stages at each moment.

Variable	Moment	Wilkes' Stages (n)		
		II (24)	III (20)	IV (1)
PAIN (mean ± SD) P Value	Preoperative	8±3	8±1,5	7
	7 days PO	3,5±2,5 <0,001*	2±1,9 <0,001*	3
	30 days PO	1±1,8 <0,001*	1±1,8 <0,001*	0
	180 days PO	0±1,1 <0,001*	0±1,7 <0,001*	4
MMO (mean ± SD) P Value	Preoperative	35±6,8	32±9,3	20
	7 days PO	29±6,8 0,002‡	26,5±7,2 0,553‡	15
	30 days PO	37±5,4 >0,999‡	32±7,6 0,999‡	24
	180 days PO	41,5±5,6 0,032‡	36±6,5 0,048‡	36
JN (n/%) P Value	Preoperative	22/95%	14/66%	1/100%
	7 days PO	0/0 <0,001İ	1/4% <0,001İ	0/0%
	30 days PO	0/0 <0,001İ	2/9% <0,001İ	0/0%
	180 days PO	1/4% <0,001İ	4/19% <0,005İ	1/100%

Abbreviations: VAS, visual analogue scale (0-10); MMO, maximum mouth opening in millimetres; JN, joint noises; PO, postoperative; SD, standard deviation; n, number of patients, and P, value of statistical significance <.05

* Paired Wilcoxon test, ‡ Student's t-test, İ Chi-square test

Table 3: Assessment of pain variables, maximum mouth opening and joint noises, with regard to unilateral and bilateral surgery at each moment.

Variable	Moment	Group (n)	
		Unilateral (30)	Bilateral (15)
PAIN (mean ± SD) P Value	Preoperative	8±2,2	8±2,7
	7 days PO	3±2,3 <0,001*	3±2,5 <0,001*
	30 days PO	1±1,9 <0,001*	0±1,2 <0,001*
	180 days PO	0±1,6 <0,001*	0±1 <0,001*
MMO (mean ± SD) P Value	Preoperative	31,5±8,7	38±6,8
	7 days PO	28±7 0,137‡	28±7,7 0,019‡
	30 days PO	33±6,1 >0,999‡	37±7,9 >0,999‡
	180 days PO	38,5±6,3 <0,001‡	38±5,5 0,696‡
JN (n/%) P Value	Preoperative	23/76%	14/93,3%
	7 days PO	1/3% <0,001İ	0/0% <0,001İ
	30 days PO	2/6% <0,001İ	0/0% <0,001İ
	180 days PO	4/13% <0,005İ	2/13% <0,001İ

Abbreviations: VAS, visual analogue scale (0-10); MMO, maximum mouth opening in millimetres; JN, joint noises; PO, postoperative; SD, standard deviation; n, number of patients, and P, value of statistical significance <.05

* Paired Wilcoxon test, ‡ Student's t-test, İ Chi-square test

Questionário – DTM

Artroscopia ATM (pré-operatório – 7 PO – 1 mês PO – 6 meses PO)

1- Onde você sente dor? ATM esquerda () ATM direita () Ambas () Nenhuma ()

2- Classifique sua dor atualmente.

0 ____ 1 ____ 2 ____ 3 ____ 4 ____ 5 ____ 6 ____ 7 ____ 8 ____ 9 ____ 10

(1-3 Leve)

(4-7 Moderada)

(8-10 Severa)

3 - A dor piora com a função (mastigação, conversação)? Sim () Não ()

4 - Você sente diminuição de sua abertura bucal? Sim () Não ()

5 - Você sente dor muscular na face? Sim () Não ()

6- Você acorda no meio da noite com dor na ATM? Sim () Não ()

7 - Você sabe se aperta ou range os dentes? Sim () Não ()

8 – Você ouve barulho na ATM quando movimenta? Sim () Não ()

9 - Você teve algum episódio de travamento mandibular? Sim () Não ()

10 - Está fazendo uso de medicação dor? Sim () Não ()

Se sim, qual? Analgésico () AINE () Miorrelaxante ()

10 - Atualmente está em tratamento para dor? Sim () Não ()

Se sim, circule o(s) tratamento(s).

Fisioterapia / Acupuntura / Placa / Tratamento medicamentoso /

TENS

Questionário – DTM**Artroscopia ATM (pré-operatório – 7 PO – 1 mês PO – 6 meses PO)**

- 12 - Sente dor muscular à palpação profissional? Sim () Não ()
- 13 - Presença de barulho articular à ausculta profissional? Sim () Não ()
- 14 - Máxima abertura bucal: _____ mm

Nome: _____ Sexo: Masc () Fem. ()

Data de Nascimento: _____ Tel: _____

Data da Cirurgia: _____

Profissão: _____

Comentário sobre o tratamento realizado?

Questionário – DTM**Artroscopia ATM (pré-operatório – 6 meses PO)**

Diagnóstico RM:

ATM direita: Ausência de DAD () LDCR () LDSR ()

ATM esquerda: Ausência de DAD () LDCR () LDSR ()

Nome: _____ Sexo: Masc () Fem. ()

Data de Nascimento: _____ Tel: _____

Data da Cirurgia: _____

Profissão: _____

Comentário sobre o tratamento realizado?

3 CONCLUSÃO GERAL

A técnica de discopexia artroscópica por fixação em dois pontos do disco articular para o tratamento de pacientes com desarranjos internos e sintomáticos da ATM mostrou-se efetiva, com melhora significativa da sintomatologia dolorosa, dos movimentos de abertura bucal e dos ruídos articulares, em um período de seis meses, para pacientes com estágios de Wilkes II, III e IV. Estudos de acompanhamento, em longo prazo, com um número maior de pacientes, com exames de imagem pré e pós-operatórias que comprovem a retro posição do disco e com investigação do retorno gradual de ruídos articulares devem ser feitos.

REFERÊNCIAS BIBLIOGRÁFICAS

- 1 Okeson JP. American Academy of Orofacial Pain. Orofacial Pain: Guidelines for Assessment, Diagnosis, and Management. 3rd ed. Chicago: Quintessence Publishing; 1996.
- 2 Dimitroulis G. Temporomandibular disorders: a clinical update. *Br Med J*. 1998; 317(7152):190-4.
- 3 Shi Z, Guo C, Awad M. Hyaluronate for temporomandibular joint disorders. *Cochrane Database Syst Rev*. 2003;(1):CD002970.
- 4 Luther F, Layton S, McDonald F. Orthodontics for treating temporomandibular joint(TMJ) disorders. *Cochrane Database Syst. Rev*. 2010; (7), CD006541.
- 5 Suenaga S, Abeyama K, Indo H, Shigeta K, Noikura T. Temporomandibular disorders: MR assessment of inflammatory changes in the posterior disk attachment during the menstrual cycle. *J Comput Assist Tomogr*. 2001; 25:476–481.
- 6 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.
- 7 Tasaki M, Westesson P, Isberg A, Ren Y, Tallents R. Classification and prevalence of temporomandibular joint disk displacement in patients and symptom-free volunteers. *Am J Orthod Dentofacial Orthop*. 1996;109(3):249–262.
- 8 Mujakperuo HR, Watson M, Morrison R, Macfarlane TV. Pharmacological interventions for pain in patients with temporomandibular disorders. *Cochrane Database Syst Rev*. 2010 Oct 6;(10):CD004715.
- 9 Goss AN. Toward an international consensus on temporomandibular joint surgery. Report of the second international consensus meeting, April 1992, Buenos Aires, Argentina. *Int J Oral Maxillofac Surg*. 1993; 22(2):78-81.
- 10 Ribeiro RF, Tallents RH, Katzberg RW, Murphy WC, Moss ME, Magalhaes AC, et al. The prevalence of disc displacement in symptomatic and asymptomatic volunteers aged 6 to 25 years. *J Orofac Pain*. 1997;11:37–47.
- 11 Chung SC, Kim HS. The effect of the stabilization splint on the TMJ closed lock. *JCrano- mandibular Pract*. 1993;11:95-101.
- 12 Mongini F, Ibertis F, Manfredi A. Long-term results in patients with disc displacement without reduction treated conservatively. *Cranio*. 1996 Oct;14(4):301.
- 13 Orlando B, Manfredini D, Salvetti G, Bosco M. Evaluation of the effectiveness of biobehavioral therapy in the treatment of temporomandibular disorders: a literature review. *Behav Med*. 2007; 33(3):101-118.

- 14 Randolph CS, Greene CS, Moretti R, et al. Conservative management of temporomandibular disorders: A posttreatment comparison between patients from a university clinic and from private practice. *Am J Orthod Dentofac Orthop.* 1990; 98(1):77-82.
- 15 Wilkes CH. Structural and functional alterations of the temporomandibular joint. *Northwest Dent.* 1978;57:287-294.
- 16 Walker RV, Kalamchi S. A surgical technique for management of internal derangement of the temporomandibular joint. *J Oral Maxillofac Surg.* 1987;45:299.
- 17 Politi M, Sembronio S, Robiony M, Costa F, Toro C, Undt G. High condylectomy and disc repositioning compared to arthroscopic lysis, lavage, and capsular stretch for the treatment of chronic closed lock of the temporomandibular joint. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2007 Jan;103(1):27-33. Epub 2006 Jul 27.
- 18 Undt G, Murakami K, Rasse M, Ewers R: Open versus arthroscopic surgery for internal derangement of the temporomandibular joint: A retrospective study comparing two centres' results using the Jaw Pain and Function Questionnaire. *J Craniomaxillofac Surg.* 2006; 34:234-241.
- 19 Smolka W, Iizuka T. Arthroscopic lysis and lavage in different stages of internal derangement of the temporomandibular joint: Correlation of preoperative staging to arthroscopic findings and treatment outcome. *J Oral Maxillofac Surg.* 2005 Apr; 63(4):471-478.
- 20 McCain JP, Sanders B, Koslin MG, Quinn JH, Peters PB. Temporomandibular joint arthroscopy: a 6-year multicenter retrospective study of 4,831 joints. *J Oral Maxillofac Surg.* 1992;50(9):926-930.
- 21 Israel HA, Langevin CJ, Singer MD, Behrman DA. The relationship between temporomandibular joint synovitis and adhesions: Pathogenic mechanisms and clinical implications for surgical management. *J Oral Maxillofac Surg.* 2006 Jul;64(7):1066-1070.
- 22 Tarro AW. Arthroscopic treatment of anterior disc displacement: a preliminary report. *J Oral Maxillofac Surg.* 1989 Apr; 47(4):353-358.
- 23 Israel HA. Technique for placement of a discal traction suture during temporomandibular joint arthroscopy. *J Oral Maxillofac. Surg.* 1989; 47:311e313.
- 24 Goizueta Adame CC, Muñoz-Guerra MF. The posterior double pass suture in repositioning of the temporomandibular disc during arthroscopic surgery: A report of 16 cases. *J Cranio Maxillofac Surg.* 2012; 40(1):86.