Diagnosis of Temporomandibular Joint Arthritic Disease Using Arthroscopic Guided Synovial Biopsies (Diagnostic Accuracy Study)

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Abstract:

Aim: The aim of this study is to determine the accuracy of serology in the diagnosis of temporomandibular joint arthritis.

Methodology: We studied 20 patients suffering from temporomandibular joint arthritis and each patient went through two tests index test, serology (including ANA, Rheumatoid factor, C-reactive protein, Anti-Cyclic Citrullinated Peptide and HLA-B27) and reference test, arthroscopic guided synovial membrane biopsy of TMJ.
Result: all the patients showed negative results regarding the index test while the reference test showed evident degeneration and damaged fibrocartilage and synovium.

Conclusion: use of serology markers is not an accurate method for diagnosis of TMJ arthritis while the best way is arthroscopic guided synovial membrane biopsy of the TMJ.

KEYWORDS: Arthritis, Rheumatoid Arthritis, Synovial Membrane Biopsy, Arthroscope, serology

INTRODUCTION

The temporomandibular joints is a complicated joint due to its manner in movement. It is the only joint type that can perform both hinge and slide actions concurrently; Additionally, temporomandibular joints in same person are connected. The way the teeth meet can also have an effect on the way the joint moves. Due to the imperfect occlusion, it's unsurprising that the temporomandibular joints are prone to problems. The three components, two joints, and mastication, can occasionally be thought of as a single functional unit; the TMJ has also historically been treated by dental surgeons rather than orthopaedic surgeons. (1)

The most significant activities of the TMJ are speech and mastication, that is why it is very interesting to many health care personnel. This passion arises from structural, functional, adaptation and symptomatology disease. (2)

Arthritis is accompanied by pain of one or more of your joints. The main symptoms of arthritis are joint limitation of movements and tenderness which can related to change in nature of the joint components, usually arthritis worsen with age.

Osteoarthritis as well as rheumatoid arthritis are the common types of arthritis. Regarding rheumatoid arthritis it is immunological disorder characterized by attacking of self immune system to the joints.

Arthritis of TMJ has many etiological factors which can be local or systemic like malocclusion, habitual factors and stress.

REVIWE OF LITERATURE

Like knee articulation, both TMJs produce a bicondylar articulation. (3) which are all common properties of synovial joints. What distinguishes the temporomandibular joint is its lining which is fibrocartilage not hyaline one. Both joints are moving together as they are acting of same bone which is the mandible. (3)

2.5 Arthritis:
In arthritis (RA) involvement of temporomandibular joint can be assessed clinically and radiographically.\(^4,5\). Recently, arthroscopic and histologic findings have been reported.\(^5\)

Arthritis of the temporomandibular joint (TMJ), also known as articular tissue inflammation, is a condition caused by either local or systemic causes. Micro or macro trauma as a result of disc dislocation, degenerative joint disease, or infection are examples of local causes.\(^6\)

Rheumatoid arthritis (RA), psoriatic arthritis (PsA), and reactive arthritis are inflammatory diseases with a systemic component. As a result of TMJ arthritis, pain, pain in the mandible and mandibular movement can occur. Gum deterioration that affects chewing function and, in infants and adolescents, the stoppage of mandibular development due to micrognathia can be caused by bone and cartilage tissue deterioration.\(^7\)

Inflamed tissue that seeks out infections and wounded tissue while promoting tissue recovery is a first-line, fast, and complicated response of the immune system. While serving a clear and vital biologic purpose during the acute phase, this reaction can potentially shift to a state with an unclear, if any, biologic purpose. It results in many of the same mediators, enzymes, and other factors being used regardless of the reason. Since inflammation plays a role in both local and systemic TMJ arthritis, the same inflammatory mediators are likely to be involved in both conditions.\(^8\)

Local concentrations of these mediators, as well as their exact composition, may vary.\(^9\)

Inflammation has been clinically defined and diagnosed from ancient times by presence of swelling, redness, warmth, pain, and decreased function. When it comes to acute inflammatory disorders like pericoronitis and sunburned skin, this is sometimes enough.

**Diagnosis of TMJ arthritis**

The inflammation within TMJ is completely different from other joints as it is rarely swollen or becomes red.\(^9\)

Temporomandibular disorders (DC/TMD) include jaw joint discomfort (including TMJ pain, jaw joint swelling, redness, and/or higher body temperature) as well as dental occlusal alterations (including posterior joint effusion) resulting from articular inflammatory exudate (e.g., posterior joint effusion). On the other hand, TMJ edema, redness, or heightened warmth occurs rarely. Decreased capacity to identify TMJ arthritis due to lack of proper identification techniques.\(^9\)

The lack of a validated and accurate reference standard has impeded previous diagnostic research on TMJ arthritis. The concentration of inflammatory mediators within synovial fluid may now be evaluated using a joint washing procedure on TMJ synovial fluid samples.\(^8\)

**Magnetic Resonance Imaging (MRI)**

MRI technology gives clinicians high resolution insight of the maxillofacial soft tissue anatomy, highly recommended.

In addition, to determine whether the disc has returned to its resting position, the TMJ is examined in a fully open mouth position. An investigation conducted with the mouth open and the mouth closed is required to accurately determine disc position and degree of decrease.\(^10\)

**Computed Tomography**

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CT has previously been used to investigate the complex anatomical features of the TMJ as well as disease processes like ankylosis, condyle fracture, and bone alterations. Noninvasive imaging of bone and soft-tissue anomalies linked to disc injury is possible with CT. However, in CT investigations of autopsy specimen materials, the disc displacement accuracy was only 40 to 67 percent.\(^{(11)}\)

**Ultrasound**

The latest generation of ultrasound systems enable rapid and precise assessment of minute joints and periarticular soft tissues. The TMJ ultrasound is user-friendly, inexpensive, and widely available, and it provides information on degenerative changes, articular effusion, and disc displacement.\(^{(12)}\)

In a similar fashion to MRI, ultrasound can be used to diagnose TMJ disc position anomalies. In comparison to other imaging modalities, however, the US has a significant advantage. It may be done during functional movements, and the articular disc will be assessed while the mouth is open.\(^{(13)}\)

**Tmj anatomy under arthroscope**

During diagnostic TMJ arthroscopy, seven anatomical regions are investigated Zone 1, oblique protuberance; Zone 2, retrodiscal synovial tissue attached to posterior glenoid process; Zone 3, lateral recess of retrodiscal synovial tissue) the posterior slope of the articular eminence, and the posterior slope of the glenoid fossa.\(^{(14, 15)}\)

First, we assess the disc position, the state of the posterior attachment tissues, and the synovium on the medial aspect of the joint before starting diagnostic arthroscopy. To find out more about the joint, the scope is then swept anteriorly from the top of the disc. Inspection reveals scarring, adhesions, and cartilage degeneration in the glenoid fossa and articular eminence, as well as synovial inflammation. If two more ports are deployed, it is possible to do arthroscopy while under direct vision.\(^{(16)}\)

**Synovial membrane biopsy:**

The surgeons commonly utilize synovial tissue sampling to exclude infection when synovial fluid or peripheral blood are unable to give clear answers, or to limit the inflammatory synovitis diagnosis by identifying diseases such as sarcoid, Behcets, or pigmented villonodular synovitis. The synovial tissue analysis utilized to determine the disease pathogenesis and/or deconstruct pathogenic processes is currently employed to gauge the prognosis and/or respond to treatment for RA, however, were hindered by the absence of synovial samples available only after death or via open arthrotomies, with the result that they exclusively studied the last stages of disease. These fears were reinforced by subsequent findings which found significant disparities in synovial cellular infiltration in patients who were or had been in the last stages of RA regardless of the existence of arthroplastic surgery as early as the 1930s.\(^{(17)}\)

Despite these limitations, researchers early on observed differences in histopathological characteristics between patients, many efforts done to have less invasive procedure to get synovial tissues.\(^{(18)}\)

**Serology**

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Rheumatoid arthritis (RA) is a chronic inflammatory illness and joint degeneration that affects about 1% of the population\(^{(19)}\). In RA, early detection and treatment are critical to avoid progression and permanent joint disability\(^{(20)}\).

A combination of history taking, clinical examination, imaging modalities, and testing of acute-phase and serological indicators such as rheumatoid factor (RF) and anti-citrullinated peptide/protein antibodies are used to diagnose RA\(^{(21)}\).

Antibodies to citrullinated peptides and proteins, as well as RF, are key serological indicators for diagnosing and classifying RA\(^{(21)}\).

RF was the first identified inflammatory marker, however it has a specificity that is restricted and it is seen in several conditions\(^{(22)}\). Overall, the RF IgM CIA outperformed the ELISA in detecting these anti-bodies. This could be due to the CIA's technological advantages, as demonstrated in a recent review study\(^{(23)}\).

**AIM OF STUDY**

The aim of this study was to determine the accuracy of serology in the diagnosis of temporomandibular joint arthritis.

**MATERIALS AND METHODS**

The study was conducted on 20 patients in the Oral and Maxillofacial Surgery Department – Cairo University suffering from temporomandibular joint arthritis, each patient went through two types of analysis serology and arthroscopic guided synovial membrane biopsy.

Eligible participants were identified according to temporomandibular joint arthritis symptoms such as pain, limited mouth opening and joint noise and were chosen from the outpatient clinic at Cairo University's oral and maxillofacial department-faculty of oral and dental medicine.

4.2. **clinical examination:**

Before the arthroscopic treatment, the patients were examined clinically, based on TMJ assessment standardized form consisting of detailed history and physical examination following the DC/TMD based on the International RDC/TMD Consortium Network RDC/TMD19.

4.3. **Radiology**

When indicated and prior to surgical planning. All patients performed panoramic view, cone beam and TMJ MRI for proper imaging of the arthritic changes within TMJ.

4.4. **Test methods**

Two types of tests were done, index and reference tests.

4.4.1 **Index test:**

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All patients went through blood samples with 10cc venous blood to check for autoimmune markers that can lead to arthritic changes within tmj.

**Markers:**

- **Rheumatoid factor**
  To be measured in a blood sample with (IU/mL) unit as the normal reference range for RF is less than 15 IU/mL
- **C-reactive protein**
  To be measured in a blood sample with (mg/dL) unit where Normal CRP levels are below 3.0 mg/dL.
- **Anti-Cyclic Citrullinated Peptide**
  To be measured in a blood sample with (titer-AU)
- **ANA**
  To be measured in a blood sample with binary outcome (positive or negative)
- **HLA-B27**
  To be measured in a blood sample with binary outcome (positive or negative)

**4.4.2 Reference test:**

Arthroscopic guided synovial membrane biopsy will be taken for histopathological examination. Light microscopy at low and high-power magnification will be used to examine the stained sections (Leica, Switzerland). The cell count will be calculated using an image analyzer computer system and the Leica Quin 500 software (Leica Microsystems, Switzerland). To avoid edge artefacts, only the most homogeneous areas of reaction will be evaluated. Light microscopy with a magnification of x400 will be used to perform an automated positive cell count in a standard measuring frame of 10 m per five fields. The outcomes will be shown on the monitor's screen. Five fields will be measured per section.

**4.4. Surgical Intervention**

Under standard general anesthesia using nasotracheal intubation, arthroscopic lysis and lavage with mandibular manipulation was performed using a 2.0 mm mini-scope set of 1.9 mm diameter, 30-degree scope (Storz, Germany). After a single fossa puncture placed in maximum concavity of glenoid fossa. Outflow needle puncture was placed in the following manner: With the mandible protruded, the scope was directed to the center of the fossa area of the joint. In order to keep the joint distended, the assistant insufflated it with 2-3 ml of fluid. Under joint insufflation, a 22 gauge, 1 1/2-inch needle was inserted approximately 5 mm anterior and 5 mm inferior to the fossa puncture site. The irrigation system was now protected by a patent. A diagnostic sweep was performed for the seven points of interest: medial synovial drape, Pterygoid shadow, retrodiskal synovium, posterior slope of the articular eminence and glenoid fossa, articular disc, intermediate zone, and anterior recess. Arthroscopic assessment of disc position, Arthroscopic, and roofing to specifically grade the amount of displacement by arthroscopic observation of the disc Adhesions
were then separated, and lateral lysis was performed. Manipulation of the mandible occurred. A total of 120 ml of lactated Ringer's solution was used to irrigate the joint space.

After completing a diagnostic sweep with a 1.9 mm 30 arthroscope (Storz) in a 2.0 inner diameter, 2.2 mms outer diameter cannula. The condyle was completely closed. Using triangulation techniques, the second puncture was placed in the most anterolateral corner of the superior joint space. After removing the irrigation needle, the joint was insufflated with 2 cc of irrigation fluid. The trocar is removed once intraarticular, and drainage of the irrigating fluid is observed through the cannula. While the surgeon continued with instrumentation, the assistant stabilizes the working cannula. Both cannulas were translated into the posterior recess using a straight probe.

The synovitis, or area of inflamed tissue, was identified. Following that, a sickle blade was used to make a stab incision in the synovium with the operative cannula, and the biopsy was performed with tissue grasper forceps (biopsy forceps). The arthroscopic variables studied were creeping synovitis, nodular synovitis, pannus formation, bullous synovium, clumping synovium, petechiae synovitis, synovial plica, hyperemia, chondromalacia, adhesions, disc perforation, joint stenosis, disc displacement, lateral impingement, loose bodies, and crystal visualization. Following biopsy tissue removal, any bleeding spots from biopsy sites were coagulated with radiofrequency in the coagulation mode. The biopsy specimen was carefully placed in a sealed sterile container containing formalin before being submitted for histopathological analysis along with the required standardized paperwork.

Hyaluronic acid was injected within the joint to promote healing and temporomandibular joint function. (fig.1,2)
Fig. 2 synovial membrane biopsy

RESULTS

5.1 Clinical results

The study was conducted on 20 patients suffering from arthritic changes in TMJ to determine the diagnostic accuracy of serology in diagnosis of TMJ arthritis.

All patients after having been diagnosed clinically and radiographically went through a series of conservative treatments by using muscle relaxants and analgesic anti-inflammatory medication to relieve the pain.

Superior repositing splits were done to the patient in order to improve their condition.

Then the non-responding patient went to operating room for biopsy and lavage using ringer lactate solution and after biopsy has been taken hyaluronic acid was injected to improve the condition of the arthritic joint.

The patients showed some improvements in their condition regarding mouth opening and pain.

All patients went through two tests: index test including ANA, Rheumatoid factor, C-reactive protein, Anti-Cyclic Citrullinated Peptide and HLA-B27 and reference test through arthroscopic guided synovial membrane biopsy.

5.2 Index test results

Table 1 results of index test
5.3 reference test results (synovial membrane biopsy):

- Histopathological examination of H&E stained sections demonstrated remnants of fibrocartilage showing signs of degeneration
- Evidence of collagen separation and tears was evident degenerated synovial membrane and extensive dystrophic calcification were evident
- Mild chronic inflammation was evident
- No malignancy was detected
- Diagnosis:

  *Evident degeneration and damaged fibrocartilage and synovium*(fig59)

<table>
<thead>
<tr>
<th></th>
<th>Rheumatoid factor</th>
<th>C-reactive protein</th>
<th>Anti-Cyclic Citrullinated Peptide</th>
<th>ANA</th>
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Fig. 3 synovial membrane biopsy under microscope

5.4 Statistical Analysis:
Using IBM SPSS Statistics for Windows, the statistics analysis was performed. Categorical data was presented as percentages (n) and frequencies (n), while continuous data was presented as mean and standard deviation (SD). This statistical analysis was performed with significance level set at P ≤ 0.05.

Using Cohen's Kappa test, agreement between thickness measurements was evaluated. To determine the association between arthroscopic-guided synovial biopsy and serological tests, Pearson's coefficient was used. With regard to predicting TMJ arthritis, sensitivity, specificity, overall accuracy, and positive and negative predictive values for serological tests were calculated.

5.5 Statistical Results:

5.5.1 Demographic data:

A set of demographic data is presented in the form of a table and figures. This study included 20 patients with TMJ arthritis. The age of the patients ranged from 21 to 56 years, with an average age of 36.57 years. While seven (35%) were male, thirteen (65%) were female. Bilateral TMJ involvement was found in eleven (55 percent) of the patients, whereas unilateral TMJ involvement was found in only nine (45 percent) of the patients.

Table 2 Demographic data.

<table>
<thead>
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<tr>
<td>Total case no.</td>
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<td>Age (years)</td>
<td>36.57±11.09</td>
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<td>Gender (n/%)</td>
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<tr>
<td>Male</td>
<td>7 (35%)</td>
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<tr>
<td>Female</td>
<td>13 (65%)</td>
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<td>Involvement side (n/%)</td>
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<tr>
<td>Unilateral</td>
<td>11 (55%)</td>
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<tr>
<td>Bilateral</td>
<td>9 (45%)</td>
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</table>

5.5.2 Diagnostic agreement and association between arthroscopic-guided synovial biopsy and serological tests:

The results of all parameters of serological tests (RF, CRP, ACCP, ANA and HLA-B27) were negative in all patients with TMJ arthritis (Table3).

Kappa test (Table.4) showed that there was no agreement between each parameter of serological test and arthroscopic-guided synovial biopsy results (K=0.000).

Pearson’s correlation coefficient (Table4) showed that there was no association between the outcomes of serological tests and arthroscopic results.

Table 3 Agreement and association between arthroscopic-guided synovial biopsy and serological tests.

| Positive arthroscopic results (n=20/100%) |
Serological tests | Frequency (n/%) | K-value | r
--- | --- | --- | ---
**Rheumatoid factor**
Positive | 0 (0%) | 0.000 | 0.000
Negative | 20 (100%) | 0.000 | 0.000

**C-reactive protein**
Positive | 0 (0%) | 0.000 | 0.000
Negative | 20 (100%) | 0.000 | 0.000

**Anti-Cyclic Citrullinated Peptide**
Positive (>17 U/mL) | 0 (0%) | 0.000 | 0.000
Negative (<17 U/mL) | 20 (100%) | 0.000 | 0.000

**ANA**
Positive | 0 (0%) | 0.000 | 0.000
Negative | 20 (100%) | 0.000 | 0.000

**HLA-B27**
Positive | 0 (0%) | 0.000 | 0.000
Negative | 20 (100%) | 0.000 | 0.000

*K*-values ≤0 indicate no agreement; *K*-values >0.01-1 indicate slight to almost perfect agreement.

*r* =0 indicates no association; *r* =+1 indicates positive association; *r* =-1 indicates negative association.

### 5.5.3 Diagnostic validity of serological tests in detection of TMJ arthritis:

All serological test results were found to be false negatives. serological tests had 0% sensitivity, 0% specificity, 0% positive predictive value, 0% negative predictive value, and 0% diagnostic accuracy regarding serodiagnostic validity (Table. Since no of the serological tests could be considered as predictors of TMJ arthritis, all of the serological tests were disproven as indicators of TMJ arthritis.

**DISCUSSION**

Rheumatoid arthritis (RA) is an autoimmune disease resulting in persistent inflammatory synovitis, usually involving peripheral joints with a symmetric distribution. The worldwide frequency of RA is 1 per cent, affecting women in 3:1 ratios and the age between 35 and 45 years more frequently than men. The TMJ is rarely a joint that is first affected in the course of the disease. The condition has several clinical signs and symptoms, the most significant of which are discomfort. In the later phases there are also limited motion, gelling (joint stiffness) and muscular spasm. RA that affects the TMJ presents to dentists in the first stages of their condition as a diagnostic problem. Comprehensive clinical exam and radiological assessment are necessary. Modalities of advanced imaging clearly show minor changes not seen by conventional radiography (cone beam computed tomography [CBCT]).
In our study patients were selected according to clinical examination done and careful history taken then all patients did CBCT and OPG to assess the bony changes within the TMJ and study was conducted on any type of arthritis.

MRI technology gives clinicians high resolution insight of the maxillofacial soft tissue anatomy, highly recommended among TMJ specialists for its diagnostic value and accuracy.\(^{(27)}\)

When it comes to evaluating the TMJ, MRI has become the method of choice. Noninvasive MRI examinations show all the soft tissue compartments of TMJ.\(^{(28)}\)

In our study we used the MRI as diagnostic tool for all the cases as it gives more accurate images to the degenerative changes within the TMJ.

The involvement of TMJ in RA usually correlates well with the radiographic damage of the joints in the hands and feet. Sodhi et al made a case study on a patient has RA with the duration of disease less than a year, and TMJ was primarily involved along with few appreciable changes in hand wrist X-ray.\(^{(29)}\)

As a rule, rheumatoid arthritis pain will appear with acute joint tenderness and swelling, morning stiffness, general discomfort, and abnormal laboratory values.\(^{(30)}\)

Early diagnosis of RA prevents or delays the progression of disease in up to 90% of those diagnosed with the disease. To have a timely and correct diagnosis in rheumatoid arthritis is vital.\(^{(31)}\)

A lot of times, RA is diagnosed by looking at patient symptoms, examination results, determining risk factors, and learning about the patient's family history.\(^{(32)}\) which has been followed in our study by using 5 serological markers as ANA, Rheumatoid factor, C-reactive protein, Anti-Cyclic Citrullinated Peptide and HLA-B27.

TMJ arthroscopy has been used to successfully identify synovitis and degenerative changes to the cartilage and disc. The upper joint space was the only part of the joint that was arthroscopically treated. Lower joint space poses a significant risk of injury to joint structures.\(^{(33)}\), hence it was avoided. It has also been demonstrated that patients tolerate it well. In clinical investigations, it is still the gold standard method for sampling synovial membranes.\(^{(17)}\)

In accordance, in our study we used arthroscope to penetrate through the upper joint space only.

Articular tissue inflammation, commonly known as TMJ arthritis, has no obvious etiology and can be caused by local or systemic causes. Micro or macro trauma as a result of disc displacement or degenerative joint disease, as well as infection, are clinical findings that must be examined in a local evaluation.\(^{(6)}\)

TMJ arthritis can cause articular pain, pain in surrounding structures, and limited jaw mobility. Occlusal alterations, decreased chewing, and development stop can occur as a result of bone and cartilage tissue degeneration, resulting in micrognathia in children and teenagers.\(^{(7)}\) The location of inflamed tissue is determined, and pathogens and wounded tissue are removed, as well as tissue repair is stimulated. The reaction shifts to a chronic state with little to no biologic purpose, if any, whereas in the acute phase it serves an obvious and important biologic function. Regardless of the cause, responses to unspecific inquiries or stimuli involve a varied set of cells, mediators, enzymes, and so on.
Synovial tissue lubricates and feeds the avascular cartilage while also lining the diarthrodial joints, tendon sheaths, and bursae. When synovial fluid or peripheral blood sampling provide insufficient information, the clinical lab should always employ synovial tissue sampling to rule out infection. Synovial tissue sampling may be performed by another clinical laboratory to help diagnose disorders like sarcoid, Behcets, or pigmented villonodular synovitis. Synovial tissue analysis, on the other hand, has proven to be a useful research tool for determining disease pathophysiology and/or dissecting pathogenic pathways that influence prognosis and therapy response. Earlier investigators in this field were hampered by a shortage of synovial samples collected from postmortem specimens or open arthrotomy. Despite the early development of arthroplastic surgery, following investigations indicated that synovial cellular infiltrate differed significantly between established and end-stage illness, demonstrating that these samples do not precisely represent RA etiology. The synovial membrane, on the other hand, may play an essential role in the worsening of osteoarthritis.\(^\text{17}\).

Although arthroscopy and synovial biopsies have a practical application, these procedures negatively affect the normal course of osteoarthritis. Synovial intima hyperplasia, hypervascularity, and inflammatory infiltrates were seen in more patients with OA who had joint-by-joint joint surgery than in those having arthroscopic surgery. It's possible that this may in part explain the fact that in the study by Holmlund et al., published in the journal Arthritis & Rheumatism, the inflammatory level recorded was remarkably high.\(^\text{34}\).

In contrast to this study we found Evident degeneration and damaged fibrocartilage and synovium.

Synovial membrane samples were acquired during unilateral arthroscopy in 40 participants in a research by LC Dijkgraaf et al. Osteoarthritis was seen in 31 of the temporomandibular joints. The number of synovial intima cell layers was substantially larger in the osteoarthritis group, and fibrous intima matrix and fibrous subintima were identified much more frequently in the osteoarthritis group than in the control group. Furthermore, intima cell hypertrophy in combination with a densely packed cell composition was found significantly more frequently in the first year of clinical signs and symptoms in the osteoarthritis group, whereas intima hyperplasia, fibrous intima matrix, dense surface material, and subintima elastic fibers were found significantly more frequently in the first two years of clinical signs and symptoms in the osteoarthritis group.\(^\text{35}\)

In contrast to this study we found evident degeneration and damage in fibrocartilage and synovium and that was because the patients included in our study were suffering from TMJ arthritis more than 5 years not only 2 years as pervious study.

Rheumatoid arthritis can be diagnosed by the presence of anti-cyclic citrullinated antibodies and a rheumatoid factor. The anti-CCP consensus is reported to have equal sensitivity and specificity in meta-analysis studies, with its predictive value for the onset of erosive illness found to be equivalent to RF. However, whereas RF and CCP targeting provide a good level of specificity, they can be detected in a wide spectrum of ailments. However, it is recommended that doctors be aware that treating RA with the anti-TNF monoclonal antibody infliximab could lead to higher levels of ANA in the blood.\(^\text{36}\)
Some research has found HLAB27 to play a role in causing arthritis in those predisposed to it. Also, HLA-B27 is recognized to play a role in the etiology of seronegative spondylarthritis.\(^{37}\) however, the presence of HLA-B27 did not seem to predispose to arthritis following acute events.\(^{38}\)

C-reactive protein (CRP) concentrations in the blood have been used as an objective indicator of disease activity in rheumatoid arthritis patients since 1973. (RA). CRP measurement appears to have at least two key roles to play in the management of RA, according to our analysis of clinical experience. For starters, consistently high CRP levels have prognostic significance. In general, people with such significant levels are at a higher risk of continued joint degeneration and may require more intensive treatment and supportive care. Second, an increase in CRP levels is an objective sign that a medicine has had a positive effect, and thus may be valuable to the clinician in monitoring therapy effects. Because CRP can be raised in a variety of illnesses other than RA, a diagnosis of RA is required before CRP can be used as a prognostic indicator.\(^{39}\)

ELISA for IgM-RF is still most useful as a screening marker in the diagnosis of rheumatoid arthritis. It is suggested that the combined use of RF isotypes and CCP is the most powerful prognostic and diagnostic tool and has greater value for clinical use than conventional RF tests on their own.\(^{40}\)
CONCLUSIONS

Based on the findings of this study:

- Serology is still a diagnostic tool of the TMJ arthritis
- The accuracy of serology in diagnosis of TMJ arthritis is questionable.
- The best way of diagnosis of TMJ arthritis is arthroscopic guided synovial membrane biopsy as it gives clear idea on the condition of the TMJ
- Arthroscopic guided synovial membrane biopsy needs to be done with special equipments and in operating room under general anesthesia or at least sedation.
- It is important to compare between serology results of the patient suffering from TMJ arthritis and synovial membrane biopsy.

RECOMMENDATIONS

- Sample size should be increased.
- Other markers should be used in diagnosis of TMJ arthritis.
- As ultrasound now used for arthrocentesis trial should be made to take synovial membrane biopsy with it this can facilitate the process of biopsy take.
- Further investigations required.

References