EARLY DEGENERATIVE SHOULDER ARTHRITIS-

HOW TO POSTPONE THE T.S.A.

Ladies and gentlemen, dear colleagues,

We start our Shoulder arthroplasty symposium with the fist talk which is " Early degenerative shoulder arthritis, how to postpone the TSA". I would try to present to you some possibilities of delaying the TSA in the early stage of degenerative shoulder arthritis.

As we all know, the normal function of the shoulder is based on motion, stability, strength of the surrounding muscles and smoothness of the articular surfaces.**The joint motion** is influenced by coordinated laxity and tension of the surrounding capsuloligamentous structures. Asymmetric tension of these structures can result in shearing forces and subsequent degeneration.

Stability of the joint is conferred by a combination of static and dynamic restraints. Instability, caused by a deficiency of any of these restraint mechanisms can lead to imbalanced joint loading and resulting wear.

Strength of the surrounding muscles is determined by the contracting forces of RC and deltoid muscles. Any weakness or injury to these can cause abnormal function and R.O.M.

Finally, **the smoothness of the joint** depends on the space of the articulating surfaces, the synovial fluid, and the integrity of the chondral surfaces. Any chondral injury or loss of space for an adequate synovial fluid increases the resistance during motion and can lead to progressive wear.

Keeping all this in mind, it is obvious, that multiple different mechanisms can cause shoulder arthritis. . This includes 8 type of arthritis.

1. **Primary OA**: Primary OA involves wear- and –tear of the articular surfaces.
   It is more common in women than men.
   It is recognized by narrowing of the joint space, subchondral sclerosis, cysts and osteophytes formation.
   It is characterized by posterior glenoid wear, unlike the central glenoid wear in RA
   This is a classical example of primary OA

2. Secondly **Inflammatory Arthritis (Rheumatoid)**: The most common form of this is Rheumatoid Arthritis. It is seen rarely in conjunction with SLE, Gout, Pseudogout, ankylosing spondylitis and psoriatic arthritis. Like OA, RA can be associated with osteophytes formation. and osteopenia. It is characterized by central glenoid wear, un like the primary OA with posterior wear.

3. **Posttraumatic Arthritis**: This is a secondary arthritis , more common in young people.

It usually occurs post trauma, fracture, or instability.

Recurrent dislocation may cause the so called dislocation Arthropathy.

Walsh et. al in 2002 reported that static posterior subluxation of the humeral head

may be a reason of early Glenohumeral arthritis in young adults (Walsh G.et al.

JSES 2002)

4. **Cuff- Tear Arthropathy**: It is well known, that patients with massive irreparable RC-tears are at high risk of developing Glenohumeral Arthritis with the characteristic proximal migration of the humeral head.

This is a classical X-Ray –example of Cuff- tear Arthropathy after failed RC- repair.

5. **Capsulorrhaphy Arthropathy**: This type of Arthritis, is associated with soft tissue imbalance, with excessive capsule tightening anteriorly, usually after open – old- surgical procedures, involving plication of these structures like Putti-Platt)

These procedures leave the shoulder grossly deficient in external rotation, causing abnormal posterior- directed forces and finally posterior glenoid wear.

6. **Osteonecrosis or avascular necrosis** of the Glenohumeral joint can be traumatic or non-traumatic in origin.

The majority of the cases is of course traumatic, after humeral head fractures (This occurs up to 34% in three part fractures, grossly up to 90% in four part fractures and nearly all the cases with anatomic neck fractures.

Much less common is the non traumatic Osteonecrosis caused by steroids use, in renal osteodystrophy , alcohol abuse in hematologic disorders etc.

7. Infective Arthritis: This is a rare type of arthritis, mainly in immuncompromised patients.
8. Lastly Neuropathic Arthritis: or Charcot Arthropathy is due to loss of the trophic and protective effects of its nerve supply. It is very rare type.

After this overview, I would like to discuss the main subject of my talk, which is, Treatment of early degenerative arthritis of the shoulder and how to postpone the Total shoulder Replacement ?

Is this possible ? How can we delay this ?

The first line goal of the treatment is to decrease the pain and to maintain or even to increase function and ROM.

The non operative treatment of Arthritis is largely dependent on the etiology , stage of the disorder, severity of the symptoms, age of the patient and must be tailored to the specific patient.

The natural history of the disease consists of acute episodes and periods of remissions

In acute setting, the treatment includes, activity restrictions, which means limiting heavy work, overhead activities and pushing and pulling movements
Oral NSAIDS and analgesics, are the main pharmacogenic therapy.
Physical therapy can also be included in the treatment regime. With the aim of reducing pain and inflammation and later to improve ROM and function.
If this kind of treatment is not successful, the next step is intaarticular steroids injections. Care must be given to the age of the patient, number and frequency of injections.

In the chronic phase of the disease the main goal is to maintain function through Physiotherapy.
Possibly also through the use of low dose of NSAID ,keeping in mind that they cannot be used for long periods due to their side effects.

The intrarticular injections of hyaluronate sodium is the new trend of treating the early OA of the shoulder. These substances have been used in the knee joint with favorable results

Now a days all the these substances, such as glucosamine, chondroidine, hyaluronic acid and hydroxyl- collagen are quite popular, and widely used in the treatment of arthritis.
Their efficacy is uncertain, although some clinical studies on knees are favorable.

SERGICAL TREAMENT

If the symptoms remain and further delay is not possible,the next step is the surgical treatment.
Of course we must respect the statement of Sperling et al (JSES 2004) that " great care must be exercised , and alternatives methods of treatment consider , before shoulder joint replacement arthroplasty is offered to patients age 50 or younger due to the unsatisfactory results in this age group"

The non-arthroplasty surgical options are arthroscopic debridement, with or without capsular release, Interposition Arthroplasty, and resurfacing procedures, with partial ,or whole head covering.

Although prospective randomized studies do not exist to clearly favor this procedure as a treatment, clinical studies have indicated that it may be successful treatment in some patients, like young active, or older, medically fragile patients.

It must be clear that, this is not a defined treatment , but only a time-buying procedure.

Arthroscopic debridement include synovectomy,
removal of loose bodies,
debridement of osteochondral lesions and unstable flaps tears of the articular surfaces,

removal of degenerated and fray labrum.
Removal of Osteophytes from the head and glenoid
Microfracture technique or drilling may be performed .
Arthroscopic capsular release may be performed if indicated. Capsular release is recommended when the patient has lost significant ROM and may help reestablish a concentric joint. A round head is prerequisite , since a flat head will not rotate even after capsular release.

This is a flap tear of the humeral head and the technique of Microfractures

After the glenohumeral arthroscopy has been performed, the arthroscope is inserted in the subacromial space and a thorough synovectomy performed.
Concerning bony acromioplasty , there is some controversy weither to perform an acromioplasty or not.
The question is the release of the acromioclavicullar ligament regarding its usefulness in a future TSA.
This part of the procedure is very critical for successful arthroscopic debridement.
It goes without saying that any additional encounter pathology must be addressed, ie Biceps pathology, RC tear, AC- Joint arthritis.

1. Weistein et al.(Arthroscopy 1994) reported good to excellent results in 80% of the patient in a follow up time of 34 months.
2. Safran et al(AAOS 2002) reported on 17 patient with advanced OA of the shoulder (Complete joint space loss, large osteophytes). All patient were referred for TSA, instead they were treated with arthroscopic debridement
   Postoperatively 82% of them were classified as good to excellent, in an average follow up of 24 months.
   Maximum pain relief was seen at 3 months and maximum functional improvement at 6 months.
   These results were maintained in 78 % of the patients in 2-4 years follow up.
3. **Weber and Kaufmann** (AAOS 2004) reported on 36 patients with severe OA, who underwent to arthroscopic debridement / subacromial

bursectomy. Survivorship with the end point defined as shoulder arthroplasty was 82% at 5 years.

4. In a study of arthroscopic debridement without subacromial busrsectomy, **Feldman and Orwin** in 2003 reported that the results seem to deteriorate with longer follow up (4 years)

In Conclusion the arthroscopic debridement and capsular release is an effective treatment option.

Early reported results have been encouraging with regard to pain relief and restoration of function in a short-term follow up, even in patients with severe OA..

It is undoubtedly a time buying procedure.

Interpositional Arthroplasty

Another option is the biologic glenoid resurfacing.

This procedure was developed in 1988 as an alternative to TSA in young active patients. Since then been developed further.

Resurfacing of the glenoid is achieved either with autograft or allograft materials.

Anterior joint capsule, fascia lata were the first used materials.

Recently allografts of Achilles tendon, lateral meniscus and human dermal are the the most popular.

In these two pictures we see some allografts.

This biologic glenoid resurfacing can be used alone, if the head is spherical , or with hemiarthroplasty.

In these pictures we see how the procedure is performed (suturing the graft on the glenoid surface)

Short –term outcomes have demonstrated successful elimination of pain ,and restoration of function. Preservation of joint space is questionable because of contradicting reports.

Nevertheless, the durability of this graft over the time is still unknown.

Partial Resurfacing

Another option for focal chonrdal lesions (f.e. significant Hill- Sachs lesion) is the partial resurfacing of the head , in patients with otherwise good joint. Its early clinical results are favorable , but long term results are lacking.

Total shoulder Resurfacing

Other option is the humeral head resurfacing.
The best type here is the well known Copeland Mark III implant
The potential advantages are:

1. Bone preserving procedure
2. Anatomic procedure without changing the anatomy of the humeral head regarding anteversion / retroversion, offset etc.
3. No requirement of intramedullary canal reaming with its complications

Results: The results of the Copeland Mark III shoulder replacement are comparable to conventional stemmed prostheses

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