Medial collateral ligament (MCL) injury, one of the most common ligament injuries of the knee, is often caused by a valgus force in sports events, motor vehicle accidents, or fall from height (1). MCL injury occurs either in isolation or together with other knee ligaments such as O’Donoghue’s triad or knee dislocations. If not well diagnosed and treated, it may lead to persistent instability, pain, and loss of function (2, 3).

Restoration of function and returning to the pre-injury level of function is the aim of treatment in ligament injuries of the knee. The ideal outcome would be a stable, pain-free knee with good range of motion.

However, medial side injuries are heterogeneous. The complex anatomy of this region has led to difficulty in planning with a standard algorithm for treatment (4). Knowing the MCL anatomy makes it much easier to understand the pathoanatomy and choosing the right method of treatment, whether conservative or surgical, based on clinical examination and MRI findings.

There are multiple soft tissue structures in the medial side that play an important role in relation to each other to retain medial side stability and resist against valgus forces. Superficial MCL, the largest structure, Posterior medial capsule (PMC), and its thickening that is often referred to as posterior oblique ligament (POL), and deep MCL as the thickening of joint capsule play an important role in medial side stabilization and resist against valgus forces.

In this editorial, we will address an old MCL injury classification defined by American Orthopaedic Foot and Ankle Society (AOFAS) that considers the posteromedial corner (PMC) as the most identifiable structure usually considered as the most important unit in the treatment process. The PMC is like the sail of a boat, becomes wider and thinner as the mast is vertical. We assume that the MCL follows the shape of the sail, becoming wider and thinner as the MCL becomes vertical. We will discuss the importance of the posteromedial corner and the relationship between MCL and PMC in planning the treatment of MCL injuries.
Medical Association (AMA) in 1966, was rather confusing because of difficulty in comparison of treatment results (8). Hughston in 1976 standardized MCL injury classification, and revised by him in 1994.

In severity grading system, grade I is few fibers injury, local tenderness without instability, grade II is more fiber damage and more extent tenderness but without or slight instability and abnormal motion. And grade III is complete tear with distinct instability (9).

Instability in grade III divides in three degrees of severity with valgus stress examination in 30 knee flexion. 1+ with 3-5 mm, 2+ with 6-10 mm and 3+ with >10 mm medial joint space opening. With grade III injuries, we usually have associated ligament injury especially ACL tear (10, 11).

We think none of each injury grading is complete and it has always been a dilemma for the orthopedic surgeons as to which patient with a medial collateral ligament injury would benefit from an early or late intervention.

According to different type of classification, whether MCL is injured in isolation or in combination with other ligaments, several treatment options with wide spectrum of nonoperative to surgical repair or reconstruction have been reported (12-14).

MRI is now a valuable investigation tool, not only tells us weather the MCL is ruptured or not, but also shows the exact site of the injury and other concomitant ligaments, soft tissue or bony lesions (15). We now choose the best initial method of treatment for acute phase in an injured knee with MCL rupture in relevant to clinical and MRI findings.

Based on the above mentioned points, we have devised a classification which gives us a better understanding of the injury pattern of MCL and choosing correct mean of treatment which suits the patient best.

Our proposed classification, based on the MRI finding:

Type I: Pre-avulsion injury, considered as a bone contusion in the medial femoral epicondyle, because of a distraction force with no separation. The patient has local tenderness with a negative valgus stress test. MRI shows bone edema at the site of MCL insertion with no separation. The trauma is not sufficient enough to separate bone or ligament from its attachment. Treatment is conservative with a short time of immobilization and pain relief [Figure 1].

In type II more severe energy does lead to bony avulsion of MCL from the medial femoral condyle. This could be easily seen on the MRI scan, and also in a plane radiograph. Patient has more pain and swelling at the site of injury and early surgical intervention usually has the best outcome in this group [Figure 2].

In type III we have midsubstance rupture of MCL usually in a zigzag pattern. This usually happens in knee dislocation type IIIM. The medial capsule is also ruptured. Clinically, the patient has more extensive...
tenderness in joint line. Valgus stress test is positive, there is echymosis in the medial side of joint. MRI shows discontinuity of MCL and joint capsule, soft tissue edema and knee effusion. Treatment in this type is optional, some prefer conservative treatment. We prefer early surgical intervention (within 14 days) with repair of the MCL together with the joint capsule and medial meniscus if damaged [Figure 3].

This mainly is applied when we are treating a knee dislocation of IIIM (KDIIIM) or a type IV dislocation in which by early repair of the MCL and joint capsule a multi directional and rotational instability is turned to a single direction instability and makes future treatments much easier.

Type IV MCL injury is considered as a MCL detachment from distal side and is usually shredded and hanging around in the pes anserinus site of insertion. Clinically, the symptoms are the same as type III, but with less swelling and echymosis. The tenderness is more distally, the MRI shows soft tissue swelling and edema in the area and discontinuity of the MCL distally [Figure 4].

The treatment option in this type is same as type III, we recommend surgical repair because conservative treatment does not seem to be efficient.

Type V MCL injury is sleeve rupture of the MCL together with the medial capsule in which medial femoral condyle is buttonholed in the capsule. Clinically the patient is not able to walk properly, is not able to extend the knee, and there is dimpling of the skin in the medial side of the knee [Figure 5].

In this type, MRI shows rupture of the MCL and capsule with edema in the soft tissues of the medial side and opening of the medial joint space. Plane radiograph could also show opening of the medial joint space [Figure 6].

This type of injury needs prompt surgical treatment to free the femoral condyle and repair the capsule and MCL.

The basis for our grading system is summarized table 1. In the clinic, by gentle examination of the patient as far as the pain allows by applying a stress valgus force we could make a preliminary diagnosis as to what has happened to the knee. Examination under anesthesia is also helpful to make more accurate diagnosis, and to examine for other ligament injuries.

MRI is now the most reliable and accurate investigation tool, this not only shows the exact site of the injury to the MCL, but also shows other ligament or soft tissue and bony injuries. The next step of treatment is based on the MRI findings.

It’s worth-mentioning that repair of the capsule in the initial phase of treatment is very important and plays basic role in the stability of the knee in future, whether other ligament injuries are treated with early repair or reconstruction. In our practice The golden time for early repair of the medial side ligament injury of the knee is the first two weeks, preferably after the
Figure 5. Type V MCL injury. (A) Skin dimpling (B) Medial femoral condyle buttonhold in the capsule.

Figure 6. Plain radiograph and MRI Scan of KDIII M knee dislocation with rupture of MCL and capsule (type V).
new classification for MCL injuries

Table 1. Summary of new MCL classification

<table>
<thead>
<tr>
<th>Type</th>
<th>MCL injury</th>
<th>Clinical findings</th>
<th>MRI findings</th>
</tr>
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<tbody>
<tr>
<td>Type I</td>
<td>Preavulsion injury femoral side</td>
<td>Little tenderness – little soft tissue</td>
<td>Bone edema in medial femoral epichondyl</td>
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<td></td>
<td></td>
<td>swelling – a stable knee</td>
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<tr>
<td>Type II</td>
<td>Avulsion injury from femoral side</td>
<td>Sever tenderness – ecchymosis – distinct</td>
<td>Bone avulsion of MCL proximally, soft tissue</td>
</tr>
<tr>
<td></td>
<td></td>
<td>soft tissue swelling</td>
<td>edema, MCL lax distally</td>
</tr>
<tr>
<td>Type III</td>
<td>Midsubstance tear</td>
<td>Med. Joint line tenderness – severe</td>
<td>Massive soft tissue edema, torn MCL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>tenderness – different level of medial</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>instability – joint effusion</td>
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<tr>
<td>Type IV</td>
<td>Distal detachment</td>
<td>More distal tenderness and edema</td>
<td>Distal soft tissue edema – MCL lax proximally</td>
</tr>
<tr>
<td>Type V</td>
<td>Proximal sleeve detachment of MCL and</td>
<td>Severe tenderness – skin dimpling -</td>
<td>Medial joint opening, soft tissue edema,</td>
</tr>
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<td></td>
<td>capsule with buttonhole of the medial</td>
<td>limited ROM</td>
<td>rupture of MCL and capsule</td>
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<td></td>
<td>femoral condyle</td>
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first week which the soft tissue swelling is subsided and the patient is in stable condition.

References