Treatment of Primary Anterior Shoulder Dislocation: **Conflicting** Study Outcomes

Prof. C. Milgrom
Hadassah University Hospital
Jerusalem, Israel
I. Natural history of shoulder dislocation and traditional methods of treatment after first dislocation
First Traumatic Shoulder Dislocation: Primary Pathology

• As the shoulder dislocates anteriorly, the movement of the humeral head can cause either an anterior labral tear (younger patients) and/or interstitial capsular stretching and tearing (older patients)

• If the torn labrum heals in place after the first dislocation, the risk of recurrent dislocation can be expected to decrease.
The goal of a first traumatic shoulder dislocation treatment is to prevent subsequent recurrent dislocations.

The traditional method for treating first shoulder dislocation is by internal rotation (IR) immobilization.
II. Primary shoulder dislocation: attitudes, beliefs and practices among orthopaedists over the years...
The 50s...
Rowe wrote his *classical* article in 1956:

Rowe CR. Prognosis in dislocations of the shoulder. JBJS(A) 1956;38(A):957-77.

1. The article was 20 pages long. All cases were admissions to the Mass General Hospital, Boston.

2. All the data, used by Rowe, was retrospective data in an era when there were no computerized databases.
3. Patients were treated either in a **sling, sling and swathe** or **strapping to the body**.

4. The subjects were further subdivided *ad hoc* into 6 groups (according to the treatment duration):

- 1 week
- 2 weeks
- 3 weeks
- 4 weeks
- 5 weeks
- 6 weeks
5. There was no statistical analysis.

6. No conclusions can be made, except that immobilization more than 3 weeks does not appear to lower the incidence of recurrent shoulder dislocation.
7. Rowe stated that the risk of recurrent dislocation in young subjects is 83%. This statement, based on weak science, was passed from one generation of orthopaedists to the next without questioning its validity.
In fact,

The Rowe’s article which had governed the thinking of the shoulder specialists all over the world for more than 40 years and was accepted as dogma, is really a Level III study with no statistical analysis.
The 60s...

1. Another **retrospective** study.
2. A study group of **566** patients.
3. A **wide age range** (from <20 to >81 years old).
4. The study subjects were treated by various physicians. There was **no standard protocol of treatment**.

5. **No randomization** was used and it is not clear on what basis a decision was taken how to treat each subject.

### Age distribution of recurrent dislocations

<table>
<thead>
<tr>
<th>Years</th>
<th>&lt;20</th>
<th>21-30</th>
<th>31-40</th>
<th>41-50</th>
<th>51-60</th>
<th>61-70</th>
<th>71-80</th>
<th>81-</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Dislocations</td>
<td>28</td>
<td>35</td>
<td>62</td>
<td>67</td>
<td>125</td>
<td>149</td>
<td>78</td>
<td>22</td>
<td>566</td>
</tr>
<tr>
<td>Recurr. Dislocations</td>
<td>13</td>
<td>11</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>6</td>
<td>4</td>
<td>1</td>
<td>48</td>
</tr>
</tbody>
</table>

Recurrences grouped according to duration of immobilisation after primary dislocation

<table>
<thead>
<tr>
<th>Duration of immobilisation</th>
<th>0-7 days</th>
<th>8-14 days</th>
<th>15- days</th>
<th>unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of primary dislocations</td>
<td>121</td>
<td>342</td>
<td>64</td>
<td>39</td>
</tr>
<tr>
<td>Number of recurrences</td>
<td>19</td>
<td>22</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Percentage of recurrences</td>
<td>16%</td>
<td>6%</td>
<td>4.5%</td>
<td>10%</td>
</tr>
</tbody>
</table>

- 16% Not normalized for age
- P value < 0.001

<table>
<thead>
<tr>
<th>Immobilisation Cases</th>
<th>121</th>
<th>342</th>
<th>64</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days</td>
<td>7</td>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>
The 80s...

1. A **prospective** study

2. The subjects were randomized according to the date on which the dislocation occurred (odd and even dates).
3. **Study groups:**

**Group 1:** 119 patients, immobilized for 3-4 weeks either in a Velpeau or with the arm tied against the body.

**Group 2:** 106 patients, using sling for 1 week or as long as they benefited from it (range from 1 day to 2 weeks) and instructed to avoid painful abduction and external rotation for 3 weeks since **day one** of the treatment.

4. Atraumatic dislocation was not an exclusion criterion.
5. Patients were evaluated, using a telephone questionnaire at two years after the dislocation.
At two year follow-up...

- ... the rate of recurrent dislocation after a first shoulder dislocation was found to be the same for shoulders immobilized 3 to 4 weeks in internal rotation and those using no immobilization device.
### Results of treatment in terms of length of immobilization

<table>
<thead>
<tr>
<th>Age</th>
<th>Group</th>
<th>No. of patients with No. Recurrence</th>
<th>No. of patients with Recurrence</th>
<th>Total (No.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 22 years</td>
<td>1 (3-4 weeks of immobilization)</td>
<td>24</td>
<td>23 (49%)</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>2 (early mobilization)</td>
<td>21</td>
<td>18 (46%)</td>
<td>39</td>
</tr>
<tr>
<td>23-29 years</td>
<td>1 (3-4 weeks of immobilization)</td>
<td>14</td>
<td>5 (26%)</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>2 (early mobilization)</td>
<td>23</td>
<td>9 (28%)</td>
<td>32</td>
</tr>
</tbody>
</table>

Hovelius et al. established that (in Sweden at least) only **60%** of patients with a primary shoulder dislocation go to the hospital.

The other **40%** visit the hospital only if the shoulder redislocates. Therefore, there is a tendency for patients with recurrences to be over-represented if only hospital data are studied and if the studies are retrospective.
III. Change of Concept in Shoulder Dislocation Treatment
In MRI studies, external rotation (ER) of the shoulder was found to result in a better reduction of the torn labrum after a shoulder dislocation.

Itoi et al. Position of immobilization after dislocation of the glenohumeral joint. A study with use of magnetic resonance imaging. JBJS(A) 2001;83:661-7.
Measurements of the labrum.

**S** (separation) = the distance (mm) between the inner margin of the labrum and the anterior aspect of the glenoid neck.

**D** (displacement) = the distance (mm) between the tip of the labrum and the tip of the glenoid rim.

Itoi et al. JBJS(A) 2001;83:661-7.
1. In his 2001 article, although Itoi reports data from 19 shoulders after dislocations, only 6 of them were primary dislocations and the rest were recurrent dislocations.

Itoi et al. Position of immobilization after dislocation of the glenohumeral joint. A study with use of magnetic resonance imaging. JBJS(A) 2001;83:661-7.
Now let’s look at the data only for the six.

Itoi et al. Position of immobilization after dislocation of the glenohumeral joint. A study with use of magnetic resonance imaging. JBJS(A) 2001;83:661-7.
### Normalized measurements of the shoulders

<table>
<thead>
<tr>
<th>Case</th>
<th>ER Angle of the arm (°)</th>
<th>Separation (mm)</th>
<th>Displacement (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>IR</td>
<td>ER</td>
</tr>
<tr>
<td>Shoulders with initial dislocation</td>
<td>1</td>
<td>35</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>81</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>47</td>
<td>5.7</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>55</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>28</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>67</td>
<td>1.3</td>
</tr>
<tr>
<td>Mean</td>
<td>52</td>
<td>1.6</td>
<td>0.7</td>
</tr>
<tr>
<td>SD</td>
<td>20</td>
<td>2.1</td>
<td>1.7</td>
</tr>
<tr>
<td>P value</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Itoi Revolution, 2001

Itoi’s conclusion:

‘Immobilization of the arm in external rotation better approximates the Bankart lesion to the glenoid neck than does the conventional position of internal rotation.’

But when you look at the data it is really not that impressive.

Itoi et al. Position of immobilization after dislocation of the glenohumeral joint. A study with use of magnetic resonance imaging. JBJS(A) 2001;83:661-7.

External rotation Immobilizer. A wire-mesh splint covered with a sponge was bent so that the curved portion fit to the trunk whereas the straight portion fit to the forearm.
A. The forearm passed through the holes created on the stockinette covering the lateral surface of the straight portion.

B. One end of the stockinette tied at the tip of the straight portion. The other end wrapped around the back of the patient, fixed at the elbow of the affected arm, passed behind the neck, and tied with the stockinette on the unaffected side. Achieved immobilization: 10° of ER
Clinical Study of Itoi et al, 2003

40 patients (aged 17-84) with first shoulder dislocation

20 - IR

30 %
follow-up 16.9 months

20 - ER

0 %
follow-up 14.7 months

Clinical Study of Itoi et al, 2003

WEAKNESSES
# Weaknesses of the 2003 Itoi study

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 1. Randomization | Patients “assigned to” treatment groups, not “randomized”.
| 2. Concurrent greater tuberosity fracture | 7 (17.5%) |
| 3. Age range (years) | Wide; 17-84 |
| 4. Mean age (years) | 39 (older patients) |
| 5. Bankart lesion probability | Low |
| 6. Gender | Mixed |
| 7. Treatment compliance | 77.5% |
| 8. Statistical methods | Chi-square when Fischer exact test should be used. |
Itoi et al. performed a randomized controlled trial to clarify the benefit of immobilization in external rotation and presented his findings at the 2007 AAOS Annual Meeting. (Paper No. 400)
Itoi et al, 2007

198 patients with initial anterior shoulder dislocation

94 (mean age 37 years) randomly assigned to internal rotation immobilization group

104 (mean age 35 years) randomly assigned to external rotation immobilization group
Itoi et al, AAOS, 2007

Intention-to-treat

94 - IR
74/94 (78.7%) – IR
Mean age 37 years
39/74 (52.7 %)

104 - ER
85/104 (81.7%) - ER
Mean age 35 years
61/85 (71.8 %)

Two year follow-up rate:

(P=0.0131)
Per-Protocol Analysis

39 - IR
15 (38.5%)

61 - ER
12 (19.7%)

Recurrence Rate (Follow-up 2 years)

Itoi et al, AAOS, 2007

(P=0.0390)
Conclusion

(Itoi):

‘…Immobilization in ER after shoulder dislocation reduces the risk of recurrence by half compared with the conventional immobilization in IR.’
<table>
<thead>
<tr>
<th>Study Characteristics</th>
<th>ITOI STUDY (n = 198)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age (Years)</td>
<td>IR: 37; ER: 35</td>
</tr>
<tr>
<td>Bankart lesion probability</td>
<td>Low (Older age)</td>
</tr>
<tr>
<td>Gender</td>
<td>Mixed</td>
</tr>
<tr>
<td>Non-traumatic dislocations</td>
<td>Not excluded</td>
</tr>
<tr>
<td>Concurrent greater tuberosity fracture</td>
<td>Not excluded</td>
</tr>
<tr>
<td>Treatment compliance</td>
<td>IR: 52.7%; ER: 71.8%</td>
</tr>
<tr>
<td>Lost to follow-up</td>
<td>20%</td>
</tr>
</tbody>
</table>
THE RECOMMENDED TREATMENT
METHODS

• **Inclusion criteria:**
  - Males aged 17-29 years
  - Healthy
  - First traumatic anterior shoulder dislocation

• **Exclusion criteria:**
  - Female
  - Concurrent greater tuberosity fracture
  - Dislocated in a motor vehicle accident
METHODS
Randomization and treatment within 72 Hrs.

- Traditional immobilization in IR (40% of the subjects)
- Immobilization at 15-20° of ER (60% of the subjects)
ER Shoulder Immobilizer
**METHODS: Post Dislocation**

Subjects, considered to have clinically stable shoulders, returned to full activity...Or didn’t...

- Shoulder Immobilization (IR or ER)
- Standard Physical Therapy Protocol (both IR and ER)
- Self-exercise (both IR and ER)

Follow-up (2 weeks), Follow-up (6 weeks), Follow-up (12 weeks), Follow-up (6 months), Follow-up (1 year)
The compliance with the treatment protocol was excellent, although patients randomized in the ER group found it **difficult to tolerate** the ER brace.

Only **one** subject did not fully comply with the treatment protocol.
RESULTS

41 males with first shoulder dislocation (age range 17-29, mean age 20.5 ± 2.7)
32 out of 41 (78%) soldiers

No statistical difference (p = 0.6) was found between the instability rates of the 2 treatment groups (ER and IR).

18 - IR

23 - ER

RECURRENT RATE
Mean follow-up 16.5 (5.6) months (range 4.5-26 months)

18 - IR

23 - ER

7

7

(38.9%) (30.4%)

follow-up 14.4 months follow-up 18.2 months

No statistical difference (p = 0.6) was found between the instability rates of the 2 treatment groups (ER and IR).