INTRODUCTION:
Stiffness is a consistent but nonspecific symptom of primary frozen shoulder, a condition defined by restriction of passive motion in all planes without glenohumeral abnormalities on plain radiographs. Theories and descriptions of the lesions have varied over time and across authors, with the main target of the pathological condition being reported as the rotator interval (RI) \(^3\). Arthroscopic capsulotomy has provided promising results in patients with persistent stiffness and localized synovitis has been detected in the area of the RI \(^4\;5\). We hypothesized RI was related with the origin of pain in this pathological condition and this was the starting point of this study. Although arthroscopic capsulotomy has been reported to be useful for primary frozen shoulder, there is no consistent treatment for RI.

We have currently performed RI release: total resection of RI tissue, accompanied with arthroscopic capsulotomy. RI tissue includes superior glenohumeral ligament and corocohumeral ligament as well as synovial tissue. Both of these ligaments are important for normal glenohumeral articulation. However, significance of these ligaments in primary frozen shoulder is not well known especially in pain control. The aim of this study was to evaluate the significance of RI release in primary frozen shoulder, for pain relief and improvement of shoulder function. This study might be eventually helpful to understand the pathological mechanism of RI in primary frozen shoulder.

MATERIALS AND METHODS:
A prospective study was undertaken of 37 patients with primary frozen shoulder those were treated with arthroscopic capsulotomy including RI release or not. There were 24 men and 13 women. The mean age at the time of surgery was 61.0 years (range, 43-73 years). Twenty-five cases were treated with RI release (mean age: 61.4 years) (plus group), and 12 cases were treated without RI release (mean age: 60.8 years) (minus group). There was no significant difference in the patients’ backgrounds between these groups. All of the patients were assessed for pain and range of motion before surgery and were monitored through to 6 months follow up. Improvement in symptoms of shoulder rest pain and night pain was measured by visual analog scale (VAS) at 3, 7 days and 1, 3, 6 months postoperatively. Clinical results were evaluated using a Japanese Orthopaedic Association shoulder scoring system (JOA score). Statistical analyses were performed using one-factor ANOVA. Significance was set at the 5% level.

RESULTS:
Clinical results with JOA score were increased postoperatively in both groups. Statistically significant improvement in JOA score was observed in the plus group compared to the minus group at 3 and 6 months postoperatively. (Fig. 1) VAS score at rest (Fig. 2) and at night (Fig. 3) were significantly decreased in the plus group than in the minus group after 7 days postoperatively. Our surgical procedure with RI release presented any adverse effects for 6 months follow up.

DISCUSSIONS:
The most important observation made in this study was that postoperative pain relief were recognized by the surgical procedure of rotator interval release. This pain relief were occurred at relatively early time of 7 days postoperatively and continued at least for 6 months. Our results indicated that some parts of the pain caused in the primary frozen shoulder were originated in the rotator interval. These pains included both of rest pain and night pain; the shoulder positions were completely different between these. The former was the pain at standing position; rotator interval capsule was extended. The latter was the pain at supine position; rotator interval capsule was compressed. Capsular tension changes at the rotator interval might stimulate the origin of the pain. Rotator interval capsule involves superior glenohumeral ligament and corocohumeral ligament. Mechanoreceptors in both ligaments could regulate the changes of the tension and make some effects for pain. Generally joint pains are thought to be regulated by the sensory nerve at the involved joint capsule. Further histological investigation for mechanoreceptor and sensory nerve distribution at the rotator interval should be necessary for more clear understanding of the pathology in primary frozen shoulder.

CONCLUSIONS:
This study has demonstrated that rotator interval was one of the pain source in primary frozen shoulder and arthroscopic capsulotomy with rotator interval release was an effective technique in the management of this disease.

REFERENCES: