Magnetic resonance findings using PETRA which made it possible to visualize joint capsules in patients with frozen shoulder

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**Introduction**

- **MRI PETRA**
  Pointwise Encoding Time reduction with Radial Acquisition

MRI PETRA allows us to detect signal from such tissue with very short T2* because of its ultra short TE available in PETRA.
Purpose

To evaluate joint capsules using MRI PETRA
Patients and methods

- From Oct, 2015～Mar, 2017
- Healthy volunteer  n=21（M 16, F 5, mean age 34y）
- Patients with frozen shoulder  n=25
  （FF <100°  ER <20°  IR <L5）
  night pain
    symptomatic  n=16（M 4, F 12, mean age 58y）
    asymptomatic  n=9（M 3, F 6,  mean age 57y）
Patients and methods

Measuring method of the thickness of the joint capsule

- in the axillary pouch (Ax)
  Symptomatic group
  vs Asymptomatic group

- in the rotator interval (RI)
  Healthy volunteers
  vs Symptomatic group
  vs Asymptomatic group
Patients and methods

- MRI
  SIEMENS MAGNETOM Skyra 3.0T

- Scan parameters of PETRA
  TR 4ms  TE 0.1ms  slice thickness 1mm

- Image analysis
  ZIOSTATION2  Ver2.4
Results

The thickness of the joint capsule in the Ax

Symptomatic 2.2 (±0.43) mm
Asymptomatic 1.8 (±0.22) mm

(Wilcoxon signed rank test)
Results

The thickness of the joint capsule in the RI

Healthy volunteers 1.4 (±0.1)mm
Asymptomatic 1.6 (±0.1)mm
Symptomatic 1.8 (±0.2)mm

(Steel-Dwass test)
Discussion

MRI study for frozen shoulder

- Synovial proliferation in the glenohumeral joint
  Tamai. Katakansetsu, 1995
- The center of inflammation was in the RI
  Okamura. Katakansetsu, 1996
- High signal in GH joint in the Freezing phase
  Itadera. Katakansetsu, 2000

Many considerations are given to high signal in the joints.
Discussion

Conventional MRI
difficult to evaluate joint capsule hypertrophy

- Thickening of the joint capsule in the rotator cuff interval are characteristic MR arthrographic findings in frozen shoulder.

Mengiardi. Radiology, 2004

Complication · pain · infection · allergy

MRI PETRA minimally invasive evaluates for joint capsule without contrast medium.
Discussion

Frozen shoulder

- Freezing phase: rest pain(+), night pain(+). Inflammation mainly in the RI.

- Frozen phase: pain (-)


MRI PETRA can clarify the change in the thickness of the joint capsule between two groups.
Conclusions

- We use PETRA to minimally invasively measurement of the thickness of the joint capsule was possible.

- We obtained the novel finding that the joint capsule in the symptomatic group significantly thickened in comparison with those in the asymptomatic group and normal shoulder group with PETRA imaging.