INTRODUCTION
Bone defect of scapula articular process is the major cause of recurring chronic posttraumatic shoulder instability. It requires surgical treatment for anatomical-functional stabilization of humeral head. For estimation of the bone defect volume MSCT with 3D-reconstruction of scapula articular process is used. If the bone defect is more than 20 % of scapula articular surface, free iliac crest autograft is applied. The autograft is fixed to the bone defect with two metal screws using standard technique (fig. 1).

Limitations of metal screws application: reoperation is necessary (to remove the implant); screws may become artefacts in further MRI scanning; metal may affect biological tissues.

AIM
To assess the effectiveness and safety of biodegradable implants in the treatment of chronic posttraumatic anterior shoulder instability under conditions of glenoid cavity margin bone defect of more than 20 % of scapula articular surface.

MATERIALS AND METHODS
November 2010 – December 2015 – admission of the patients to the clinic of Irkutsk Scientific Center of Surgery and Traumatology for open single-center controlled randomized partially blind study.

Inclusion criteria: 1) traumatic primary shoulder dislocation; 2) one-side injury of shoulder; 3) two and more shoulder dislocations in the anamnesis; 4) postoperative recurrence of shoulder dislocation; 5) bone defect of anteroinferior margin of scapula articular process not less than 20 % of scapula articular surface; 6) age – 18–60 years.

Exclusion criteria: III–IV degree of blade-humerus joint osteoarthrosis.

26 patients in total – the group of treatment (10 patients, biodegradable screws) and the group of comparison (16 patients, metal screws).

Biodegradable screws
We used 4.5 mm biodegradable compressing screws (ActivaScrew™ PLGA 85L/15G) which maintain strong fixation during first 8 weeks after the insertion with full degradation within about 2 years. The polymers dissolve in vivo during hydrolytic degradation into α-hydroxyacids, which are excreted metabolically. The screws are compatible with AO instruments and have metal single-use adaptor for insertion.

X-ray diagnostics
Preoperative period: standard two-dimensional X-rays, multi-layer spiral CT with 3D-reconstruction of shoulder (intact and injured side). This allowed us to estimate and to plan the extent of surgical procedure.

Postoperative period: check-up X-ray of operated shoulder (right after the surgery) and CT-3D (in 3 months after the surgery).

RESULTS
The results of surgical treatment were estimated within 12 months after the surgery (fig. 2, 3).

Rowe Score for Instability:
the group of treatment – 14,9 points increase (in 6 months).
ASES Shoulder Score: the group of treatment – 11,6 points increase.

Fig. 1. Scheme of fixation of an implant

Fig. 2. Patient K., comparison group. CT-3D before (a, b) and after (c, d) the surgery

Range of motions in shoulder joint (in 6 months): 35° increase in abduction, 25° - in external rotation (p < 0.05) (fig. 4).

X-ray evidence: consolidation of free autograft without osteolysis or widening of a drilled hole. The proper (edge-to-edge with the joint) position of bone autografts.

Fig. 3. Patient N., treatment group; CT-3D before (a, b) and after (c, d) the surgery

Fig. 4. Range of motions (abduction, external fixation) in treatment and comparison groups before and in 3, 6 and 12 months after the surgery.

We did not observe either any failures of union, formations of false joint, screw fractures in bone tissue nor any postoperative complications, such as hematomas, infections, or synovitis.

DISCUSSION
3D-reconstruction of glenoid cavity allows us to estimate bone defect zones (location) and to calculate bone defect size (width, length, thickness) and its area in comparison with intact side. Inclusion and exclusion criteria for osteoplasty (bone defect more than 20 %) and autograft size are determined.

Advantages of using biodegradable implants:
- no repeated surgeries for the implant removal are required (which also means lesser financial load for insurance companies);
- lowering the chances of technical difficulties (i.e. metal screws, bone canals from the screws, latent infection in the area of metal implants etc.) in case of repeated surgeries of an operated segment;
- opportunity of using any visualization methods without risk of artefacts.

CONCLUSION
Our study of using modern biodegradable implants in osteoplastic stabilization of shoulder joint with bone defect more than 20 % of scapula articular surface showed its effectiveness and safety in patients of young and active working age (2A in the Oxford CEBM Levels of Evidence).