Introduction: Rupture of the rotator cuff is very common but only little is known about the histochemical properties of the ruptured tendon. The aim of the present study was to analyse tendon samples histologically and relate these to anthropometrical data of the patients as well as clinical, radiological and intra-operative findings.

Materials and Methods: A total of 42 patients (average age 58.5 ± 7.5 years, 20 female and 22 male) with rotator cuff rupture were included in the study. Clinical examination, x-ray, ultrasound and MRI were performed preoperatively. Biopsies from the ruptured tendon were obtained during the operation. Collagen (COLL), pentosidine (PENT), hydroxylysylpyridinoline (HP) and lysylpyridinoline (LP) content of the tendon were analysed (pmol/mg dry weight). At follow-up after 5.9 ± 1.0 years ROM and UCLA-score were obtained.

Results: COLL and HP/mg dry weight were significantly higher in males than in females (1993 ± 801 vs. 1441 ± 538 pmol/mg, p=0.007 and 2976 ± 1224 vs. 2181 ± 1263 pmol/mg, p=0.037 respectively). LP tended to be higher in males (205 ± 75 vs. 183 ± 76 pmol/mg, n.s.) and PENT lower than in females (19.6 ± 13.0 vs. 21.3 ± 15.9 pmol/mg, n.s.). A weak negative correlation between age and COLL (r=-0.308, p=0.047) and a weak positive correlation between age and PENT/COLL-ratio (r=0.391, p=0.010) were found. The patients, who presented with symptoms in the contralateral shoulder at follow-up showed a significant increase in COLL, HP and HP/LP-ratio (2068 ± 1259 vs. 3332 ± 1135 pmol/mg, p=0.021; 1412 ± 651 vs. 1924 ± 645 pmol/mg, p=0.017 and 11.3 ± 3.2 vs. 17.2 ± 3.3 p=0.003) as compared to cases without contralateral symptoms. No correlation between histochemical parameters and aetiology of the rupture (traumatic/degenerative), duration of symptoms, radiology (US,MRI), rupture size, pre- or post-operative ROM, UCLA-score, or BMI was found.

Discussion: Animal studies have shown that collagen content of tendons increases with training. Males often perform physically more demanding work than females which may explain the higher collagen content found in men. In our study collagen content of the tendon decreased with increasing age, which is contrary to the assumption that degeneration leads to a relative increase in tendon collagen content because other structures of the matrix decrease first. However it has also been shown that degenerated supraspinatus and subscapularis tendons have a reduced collagen content (1). Pentosidine-collagen-ratio increased with age partly due to collagen decrease but an accumulation of pentosidine with age could also be expected, although no correlation between age and pentosidine was found in the present study. A similar observation was reported by Bank et al. (2). In their study pentosidine levels increased with age only in normal tendons. Patients who showed symptoms of the contralateral shoulder at follow-up had significantly higher collagen content in the tendon biopsy than patients with only one affected shoulder. This finding may indicate a predisposition for rotator cuff degeneration. We could not find any differences in collagen content between traumatic and degenerative cuff tears, which may be due to the relatively high age of our patients and small number of traumatic ruptures (n=10). At an age of almost 60 years degenerative changes may already be present in most cases.