Introduction:
Gaston et al. reported on pisotriquetral (PT) dysfunction following limited and total wrist arthrodesis, which might cause persistent pain after such salvage procedures. Rancy et al. found a 4x higher prevalence of severe PT osteoarthritis with carpal collapse (16.7%) compared to a control group (4.2%). Both studies had only a small study group, insufficient for statistical analysis. We hypothesize that the dorsal tilt of the lunate and triquetrum in a carpal collapse might result in a subluxation of the PT joint with subsequent, precipitate osteoarthritis (OA).

Aim of this study was to analyze the PT joint of patients with an advanced carpal collapse with regard to the cause and stage of the carpal collapse, age of the patients and a concomitant PT subluxation. A large study group and analysis by adequate diagnostic images were chosen to assure reliable results.

Methods:
We identified 234 patients with a carpal collapse stage 2-3°, who had sectional images prior to a salvage surgery, appropriate to evaluate the pisotriquetral (PT) joint. 83% were men, the patients’ mean age was 50 (21-76) years. 86 patients had a scaphoid nonunion advanced collapse (SNAC) and 148 patients had a scapholunate advanced collapse (SLAC).

In 89 patients, preoperative MRI and in 145 patients, CT scans were assessed. Those were retrospectively evaluated with regard to subluxation or OA of the PT joint. Subluxation was defined according to Vasilas et al. as loss of parallelism between joint surfaces >20°, pisiform translation of more than 15% related to the triquetrum joint surface, or joint gap widening (Fig. 1 and 2)

To classify OA a rating system was used: Weak criteria for osteoarthritis were subchondral sclerosis or subchondral cysts either in the triquetrum or pisiforme (5 points each), preponderating criteria were joint space narrowing <1mm or presence of osteophytes (15 points each). Severe OA was assumed if all criteria found had a sum of 20 points or more.

The prevalence and degree of PT osteoarthritis was analyzed according to the cause and stage of the carpal collapse, age of the patients and a concomitant PT subluxation.

Results:
Among all patients, PT osteoarthritis was found in 76%, 71% of all SLAC wrists, and 85% of all SNAC wrists. In SLAC wrists, the prevalence was significantly higher in stage 3° (77%) than stage 2° (52%). In SNAC wrists, both stages were similar (83 and 85%) and significantly higher than in SLAC wrists. Severe Osteoarthritis was significantly more often observed in SLAC wrist 3° (53%) than in 2° (21%), SNAC wrists had a high 58% at both stages.

The highest rate of PT osteoarthritis was found in patients younger than 30 years (88% of 17 patients) and patients older than 70 years (91% of 11 patients). The lowest rate had patients between 30 and 39 years of age (58% of 31 patients). Patients in their 4th, 5th and 6th decade of age had 79, 76 and 77% PT osteoarthritis rate.

66% of all patients had a subluxation of the pisiforme, mainly a translation proximally, followed by a tilt into flexion, less patients had a widening of the joint gap. The rate was similar in SLAC- and SNAC wrists, except a higher rate of patients with palmar tilt among the SLAC wrists. With regard to the 154 patients with pisiforme subluxation, 80% of them had concomitantly a PT osteoarthritis, 49% a severe osteoarthritis. Vice versa, 69% of the patients with a severe PT osteoarthritis had simultaneously a pisiforme subluxation.

Conclusion:
Carpal collapse comes very often along with PT osteoarthritis, in SNAC wrist more often and earlier than in SLAC wrists. Subluxation mainly occurs in a direction, which is physiological for an extended wrist position and might be contributed to rotational deformity of the lunate and triquetrum (DISI) with carpal collapse.

Clinical relevance:
PT osteoarthritis might cause residual pain after partial or complete wrist fusion, performed as salvage procedure for patients with carpal collapse.

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