

EXCISION OF *OS LUNATUM* IN THE TREATMENT OF LUNATOMALACIA

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*The small size of *Os lunatum* and its nature as an articulation element which movement is similar to that of a "tank track" reduces the opportunities for free functioning of the radiocarpal joint after lunate damage. During a 15-year period (1982-1997) a total of 13 patients underwent an excision of *Os lunatum*. They were 9 males and 4 females aged between 38 and 60 years (mean age of 41 years and 3 months). Eight patients were at IIIA stage after Lichtman, two – at IIIB, and three – at IV stage of the disease. Intercarpal arthodesis after O. Craner (1966) was additionally performed in 9 patients after extirpation of *Os lunatum* under conditions of a severe lunate collapse. A good result (of 22-26 scores) was obtained in seven patients, a satisfactory one (of 13-15 scores) - in 3 patients but a poor one (below 8 scores) in 2 patients only. The good results after the application of the excision and particularly of the resection of *Os lunatum* proved the appropriateness of this method for the treatment of Kienbock's disease at stages III and IV in case of absent arthrotic alterations of radius, *Os capitatum*, and *Os scaphoideum*. The intercarpal arthodesis ensured anaesthesia and carpal stability despite a certain restriction of range of motion.*

Key words: Kienbock's disease, resection of *Os lunatum*, excision of *Os lunatum*, roentgenology, range of motion

The excision of *Os lunatum* is one of the first operations in the treatment of Kienbock's disease. The extirpation of *Os lunatum* is warranted in case of its fragmentation and deformation most commonly complicated by painful sinovitis. In a historical aspect, already in 1931 P. Konjetzny suggested a resection of the dorsal surface of the

lunate bone. He expected an invasion of surrounding tissues into the osseous core and thus an improved trophics of this bone.

There are scanty reports in the literature available dealing with longitudinal following-up the clinical cases with excision of *Os lunatum* (1-6,8-10,12-15). The data about good post-operative results in patients with Kienbock's disease at stage III and IV inspired us to make use of this operative method.

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MATERIAL AND METHODS

During a 15-year period (1982-1997) a total of 13 patients underwent excision of *Os lunatum*. They were 9 males and 4 females aged between 38 and 60 years (mean age of 41 years and

3 months). Dominant hand was previously damaged in 12 cases. Anamnestically, an injury was reported by three patients. Patients' complaints had begun 4 years before the clinical examination (Table 1).

Table 1

Distribution of the patients with extirpation of Os lunatum

Bone extirpation	
n	13
gender	
males	9
females	4
age range	38-60 years
mean age	41 years and 3 months
duration of follow-up	5 years
dominant hand	12
preceding injury	3
onset of complaints	4 years and 2 months
stage after Lichtman	
I	0
II	0
IIIA	8
IIIB	2
IV	3
ulna variance	
ulna negative	3
ulna neutral	9
ulna positive	1

The mean value of the ulna negative variance was $-2,86$ while the ulna positive variance was $+1,63$.

Operative technique

In cases at stages IIIA, IIIB, and IV of the disease resection with or without subsequent excision with or without replacement was applied. The re-

section was used in the patients with proximal necrosis that, on its part, favoured the preservation of the relationships between the wrist bones and thus avoided the proximal and ulnar migration of *Os capitatum* and *Os triquetrum*. In case of central necrosis after the extirpation of *Os lunatum*, the

tendon of *M. palmaris longus* was used for replacement in 3 cases but that of *M. extensor carpi radialis brevis* - in one case as the endings of the latter were shaped like a roll. In one case in the roll itself some part of the extirpated *Os lunatum* was implanted, too. In 7 cases with excision of *Os lunatum* a distally based fascial flap after Nahigian's et al. method (11) was used to avoid the restriction of volar wrist flexion. Intercarpal arthodesis after O. Craner (1966) was additionally performed in 9 patients after extirpation of *Os lunatum* under conditions of a severe lunate collapse.

RESULTS AND DISCUSSION

Preoperative clinical status

Pain occurs mainly after strenuous work loadings in three patients while it persists in the rest 10 cases. The range of motion in the damaged and intact wrist is compared on Table 2. Grip strength enhanced from 15 kg preoperatively up to 23 kg postoperatively.

Preoperative roentgenologic status

The most common findings were the following:

- * thinning, fragmentation, and sclerosis of the lunate,
- * ulna shortening in 3 cases (ulna negative variance) while ulna neutral variance was proved in 9 cases, and
- * lowered carpal height and light proximal and ulnar translation of wrist bones.

Postoperative clinical status

An own score system for assessing the operative results (Table 3) along with Stuart Kuschner's scheme for evaluating the achieved anaesthesia (Table 4) was applied.

The results were considered good (22-26 scores) in seven patients, satisfactory (13-15 scores) - in three but poor (below 8 scores) - in two patients.

Postoperative roentgenologic status

The carpal height ranged between 0,22 and 0,36 (on the average of 0,24). The values of the carpoulnar distance varied between 0,10 and 0,30 (at an average of 0,24). The postoperative changes in wrist bone arrangement and the proximal migration of *Os capitatum* were delayed up to 5 years after the intervention.

The excision of *Os lunatum* represents a method of treatment in which either the process of bone destruction has already advanced to a great extent (up to stages III and IV), or the methods used previously such as conservative therapy, "level" operations (7), revascularizations, etc. failed to ensure a good effect. In case of central necrosis, a more common form of lunatomalacia, an extirpation was applied while in case of peripheral necrosis, a less frequent form presenting mainly with alterations of the proximal bone surface and most often caused by traumatic lesions, a resection was used.

Table 2*Range of motion of damaged and intact hand prior to treatment*

Range of motion	Damaged hand	Intact hand
flexion/extension	30°-0°-15°	70°-0°-60°
ulnar/radial deviation	15°-0°-10°	50°-0°-20°

Table 3*Score system for operative result assessment*

Parameters	Scores
Clinical evaluation	21
Wrist pain	
absent	10
during strenuous physical work	7
during light physical work	4
Grip strength (% of that of intact hand)	
90 %	5
80 %	4
70 %	3
60 %	2
40 % -50 %	1
Increase of flexion-extension arc	
< 20°	6
10° - 19°	5
5° - 9°	3
Roentgenographic evaluation	9
improvement of sclerotic alterations	1
improvement of cysts	1
improvement of fragmentation	1
Stahl's index	3
increased	3
unchanged	1
Carpal height ratio	3
increased	3
unchanged	1
Scintigraphic evaluation	3
normal bone metabolism	3
increased bone metabolism	1
Total assessment	
excellent	27-33
good	20-26
satisfactory	13-19
poor	0-12

In three patients after the extirpation of *Os lunatum* the formed cavity was filled-up with the tendons of *M. palmaris longus* and *M. extensor carpi radialis brevis* shaped like a roll. In one of these cases some part of the removed *Os lunatum* was implanted. After the excision of *Os lunatum*, *Os scaphoideum* shortening that results from the flexion, along with the proximal migration of *Os capitatum* plays a role in the dynamic rearrangement of the rest wrist bones through intercarpal

pressure reduction. Sometimes, carpal height lowering exerts a favourable effect on the contact between *Proc. styloideus ulnae* and *Os triquetrum*. Usually, this process was asymptomatic. In some patients, however, pains in ulnar deviation and dorsal flexion as well as cysts in *Os triquetrum* and ulnar head could be observed. These cysts occurred predominantly in normal radioulnar disposition while they were absent in negative ulnar variance. Improved range of motion is presented in Table 5.

Table 4

Score system for anaesthesia assessment

Results	Criteria	Patients
excellent	Absent pain at rest and during physical loading	5
good	Absent complaints and discomfort at rest but slight pain during strenuous physical work	2
satisfactory	Dyscomfort at rest or endurable pains during work requiring the change of profession	1
poor	Persisting pain even at rest	0
Total		8

Table 5

Follow-up of range of motion

Range of motion	Damaged hand		Intact hand	
	after 6 months	after 12 months	after 6 months	after 12 months
flexion/extension	25°-0°-10°	40°-0°-20°	70°-0°-60°	70°-0°-60°
ulnar/radial deviation	10°-0°-10°	25°-0°-10°	50°-0°-20°	50°-0°-20°

CONCLUSION

The good operative results after the excision and particularly after the resection of *Os lunatum* prove the ap-

propriateness of this method in the treatment of Kienböck's disease at stages III and IV when arthrotic alterations in the radius, *Os capitatum*, and *Os scaphoideum* are absent.

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Ексцизията на *Os lunatum* в лечението на лунатомалацията

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Резюме: Малкият размер на *Os lunatum* и характерът ѝ на елемент в ставата, чието движение напомня "гъсенична верига на танк", намалява възможностите за безпрепятствено функциониране на радиокарпалната става след увреждането ѝ. За период от 15 години на 13 болни направихме ексцизия на *Os lunatum*. Осем от болните бяха от III-A стадий, двама - от III-B стадий и трима - от IV стадий по Lichtman. Допълнително при 9 болни след екстирпация на *Os lunatum* и тежък лунатен колапс направихме интеркарпална артродеза по O. Graner (1966). Добрите резултати, получени при ексцизията и особено при резекцията на *Os lunatum*, правят метода подходящ при лечението на III и IV стадий на болестта на Kienböck при отсъствието на артрозни промени в радиуса, *Os capitatum* и *Os scaphoideum*. За болните с лунатомалация от III-B и IV стадий по Lichtman с некроза и тежък лунатен колапс перспективите при лечение чрез интеркарпалната артродеза на O. Graner са благоприятни. Тя осигурява обезболяване и възвръща стабилността на китката въпреки ограничения в различна степен обем на движение.