

Fractures of the fifth metacarpal neck treated by syndactyly: functional and quality of life outcomes of a series of 39 patients

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The management of the fractures of the fifth metacarpal neck is still debated between surgical, orthopedic, and functional treatments. The main objective of our study was to report the functional results at two, six, and twelve weeks of patients treated with syndactyly for fifteen days for a fracture of the neck of the fifth metacarpal and to determine if these results were compatible with a short-term medical follow-up and if they allowed for a quick return to work. Thirty-nine patients were retrospectively included. Functional results and their variations were analyzed at two, six, and twelve weeks using self-questionnaires filled out during consultation (VAS scores, QuickDASH, EuroQol-5D-5L, and EuroQol-5D-VAS). The duration of work leave was extracted from medical records. Two weeks after the trauma, patients mostly had a very moderate impact of their fracture on their daily life with an average VAS of 4.2 ± 1 , QuickDASH of 42.2 ± 20.9 , and EuroQol-5D-VAS of 78 ± 11 . QuickDASH and EuroQol-5D-VAS scores showed significant improvement between two and twelve weeks of follow-up, decreasing from 42.2 ± 20.9 to 2.1 ± 6 and from 78 ± 11 to 96 ± 6 , respectively ($p < 0.0001$). The dimensions of common activities, pain, and autonomy had the most patients in the “moderate impairment” subgroup at two weeks. Only the dimension of common activities still had 21% of patients moderately impacted. Twenty-five patients returned to work at an average of 21.8 ± 1.5 days. Syndactyly treatment offers good functional results at two weeks that are confirmed during follow-up, compatible with reduced medical follow-up and early return to work.

Keywords : metacarpal, syndactyly, work, follow-up.

INTRODUCTION

Extra-articular fractures of the neck of the fifth metacarpal represent 20% of all hand fractures¹. They mainly affect young men between 20 and 35 years old, who are in full professional activity. Their treatment is debated^{2,3}. Historically, in cases of significant palmar angulation ($>30^\circ$) or shortening of the metacarpal, surgical treatment was preferred⁴. Its modalities vary, ranging from osteosynthesis with plates to that with pins^{5,6}. Apart from surgery, orthopedic treatment with immobilization in the intrinsic-plus position for three to six weeks was the most common⁷. The functional outcomes of these two treatments were similar at one year². This had the effect of expanding the indications for non-surgical treatments to palmar inclinations up to 70° . More recently, a management approach with minimal immobilization using syndactyly has been developed⁸. Several publications report excellent functional results with this treatment^{9,10}.

Functional treatment with syndactyly has several advantages. The absence of surgery avoids anesthetic and surgical risks^{6,11}. The absence of immobilization and therefore stiffness reduces the risk of functional sequelae. Clinical follow-up is lightened since no cast refitting is necessary, and the patient does not have to undergo dressing care. In the absence of immobilization for six weeks, patients should be able to return to work more quickly than with orthopedic or surgical treatment. The functional treatment of these fractures would reduce direct and indirect healthcare costs.

The main objective of our study was to report the functional results at two, six, and twelve weeks of patients treated with syndactyly for a fracture of the neck of the fifth metacarpal and to determine if these results were compatible with a short-term medical follow-up and if they allowed for a rapid return to work.

MATERIALS

This is a retrospective study of adult patients admitted to the emergency department of the University Hospital of Rennes for a fracture of the fifth metacarpal neck and followed up in orthopedic consultation between June 1st, 2020 and January 1st, 2022. The patients included in our study were those eligible for treatment by syndactyly according to our local recommendations: recent (<7 days) and isolated fracture of the fifth metacarpal neck, closed, without rotational disorder, with an anterior tilt <70° measured according to Sletten¹² or Wierer¹³, and shortening <2mm of the 5th metacarpal. They received a consultation with an orthopedic surgeon in the emergency department who explained the modalities of syndactyly treatment: maximum of 15 days, adhesive strips and compresses to be changed every 48 hours, painkillers, and anti-inflammatory treatment. Mobilization was encouraged as early as possible.

To be included in our study, patients had to have a complete follow-up in consultation at two, six, and twelve weeks. Exclusion criteria were minors, persons deprived of their liberty, under protective measures, or those who refused to participate in the study.

Demographic, clinical, and follow-up data were extracted from medical records and consultation reports. When consulting in our institution, patients had to complete a standardized routine questionnaire at each consultation, including a Visual Analog Scale for Pain (VAS), the Disabilities of the Arm, Shoulder and Hand (QuickDASH) score in its shortened version, and EuroQol-5D-5L® (EuroQol Group, Rotterdam, Netherlands) in French version.

The QuickDASH score assesses the level of upper limb disability¹⁴. Its use in its French version has been validated¹⁵. Patients must answer 11 questions about activities rated from 1 (no difficulty) to 5 (impossible). The score obtained ranges from 0 (no impairment) to 100 (upper limb impotence). The Minimal Clinically Important Difference (MCID) of the QuickDASH score has been set between 15 and 20¹⁶.

The EuroQol-5D-5L® questionnaire evaluates patients' overall quality of life. It consists of two parts: the first part is composed of five questions on five dimensions (mobility, autonomy, daily activities, pain, anxiety) rated from 1 (no problems) to 5 (unable). We divided the responses into two categories for analysis: mild impairment (score 1-2) or moderate impairment (score 3-5). The second part is a visual analog scale of quality of life (EuroQol-5D-VAS®) ranging from

0 (poor) to 100 (excellent). Currently, there is no validated MCID for EuroQol-5D-VAS®¹⁷.

Quantitative variables, VAS, QuickDash and EuroQol-5D-5L-VAS® were reported as mean and standard deviation. Qualitative variables were reported as proportion and minimum-maximum values. The change in VAS, QuickDash, and EuroQol-5D-5L® scores at two, six, and twelve weeks were studied using a paired Student's t-test and a one-way ANOVA with Geisser-Greenhouse correction. The variation in the distribution of responses between "mild impairment" and "moderate impairment" during follow-up was analyzed using an exact Fisher test.

Statistical tests were performed using GraphPad Prism version 8.0.2 software (GraphPad Software, San Diego, CA, USA). The significance threshold was set at $p < 0.05$.

Data retrieval was carried out using the MR-004 reference methodology. The local ethics committee approved the study (Opinion No. 22.74).

Level of evidence: IV.

RESULTS

Our study population consisted of 64 patients who were admitted to the emergency department of the University Hospital of Rennes for a fracture of the fifth metacarpal neck. Forty-four patients were followed up for twelve weeks in specialized consultation and included in the study (Figure 1). After reviewing medical records, five patients were excluded (two minors and three patients deprived of liberty). The demographic data of the included patients are summarized in Table I.

Table II reports the VAS, QuickDASH, and EuroQol-5D-VAS scores at two, six, and twelve weeks. The level of pain reported by the VAS showed a decrease from 4.2 ± 1.1 at two weeks to 0.4 ± 0.6 at twelve weeks ($p < 0.0001$). Patients showed significant improvement in their QuickDASH functional scores between two (42.2 ± 20.9) and six weeks (16.4 ± 20.3) ($p < 0.0001$), which was confirmed between six and twelve weeks to reach an average QuickDASH of 2.1 ± 6 at twelve weeks ($p < 0.0001$). The evolution was similar on the EuroQol-5D-VAS® score between two and six weeks ($p < 0.0001$) and six and twelve weeks ($p = 0.014$). Patients had an average EuroQol-5D-VAS® score of 96 ± 6 at the end of their follow-up. Figures 2 and 3 show the evolution of QuickDASH and EuroQol-5D-VAS® scores over time. Table III and Figure 4 report the distribution of patients' responses regarding the five dimensions of the EuroQol-5D-5L® score and its variation during follow-up. At two weeks of follow-up, 95% of patients

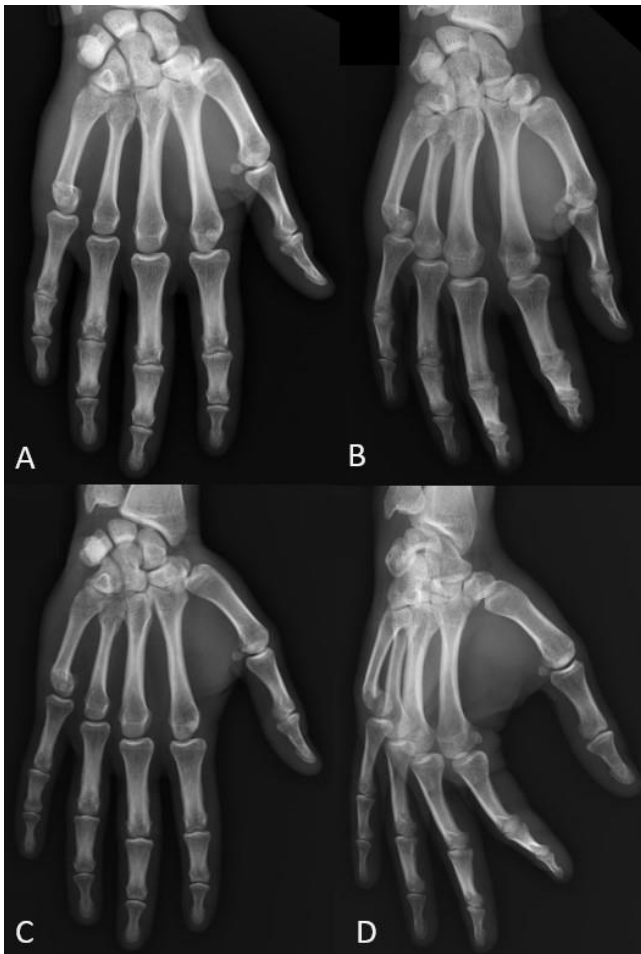


Figure 1. — 21-year-old patient with a fracture of the fifth metacarpal neck eligible for syndactyly. Initially (A,B) then at three months of follow-up (C,D). He had returned to work as a mason at 20 days.

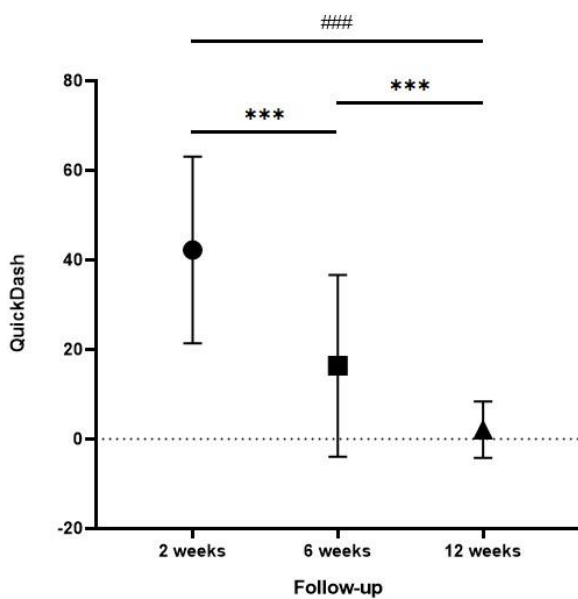


Figure 2. — Variation of QuickDASH score during follow-up. ***: Paired t-test, $p < 0.0001$. ###: ANOVA, $p < 0.0001$.

Table I. — Demographic and clinical characteristics of the 39 patients included in the study.

Variable	Population (N=39)
Gender	
Man	36
Woman	3
Age*	31 (12)
Dominant side affected	38
Smoking status	
Active smoker	31
Non smoker	8
Professional status	
Student	7
Heavy worker	12
Salesperson	3
Computer scientist	3
Temporary worker	12
Retired	2
Cause of the fracture	
Fall from a bicycle	2
Deliberated punch in wall	21
Fight	16
Anterior tilt (degrees)*	43 (11)

*Mean (Standard Deviation)

Table II. — Variation of the VAS, QuickDASH and EuroQol-5D-VAS® scores during the three-month follow-up of the 39 patients included in the study.

Score	Two weeks	Six weeks	Twelve weeks	P value*
VAS**	4,2±1	1,1±1,4	0,4±0,6	$P < 0,0001$
QuickDASH**	42±21	16±20	2±6	$P < 0,0001$
EuroQol-5D-VAS**	78±11	90±15	96±6	$P < 0,0001$

*Analysis of variance (ANOVA) for repeated measure with the Geisser-Greenhouse correction. **Mean±Standard-Deviation.

had mild impairment in the mobility and anxiety dimensions. The autonomy, daily activities, and pain dimensions had 75%, 54%, and 64% of patients in the “mild impairment” group, respectively. At six weeks of follow-up, only the daily activities dimension had fewer than 90% of patients in the “mild impairment” group. Only the daily activities dimension continued to improve between six and twelve weeks.

Twenty-five patients had an average of 21.8 ± 1.5 days off work. Five patients did not stop their professional activity (two salespeople and three craftsmen). Seven students and two retirees were not eligible for this data.

DISCUSSION

The 39 patients included in our study had demographic characteristics comparable to previous series. The

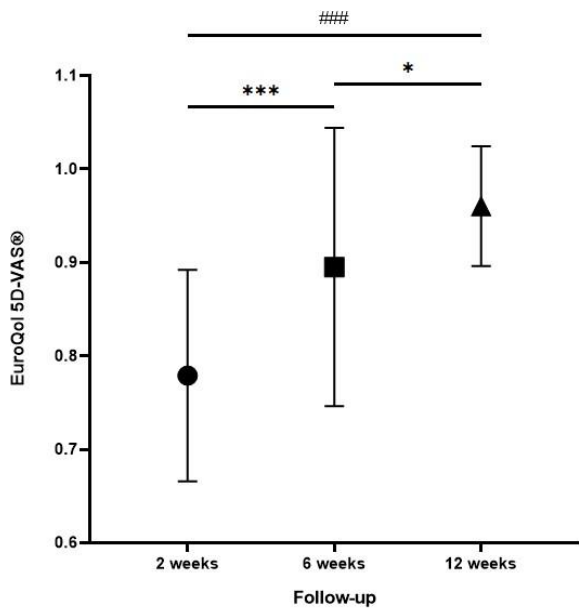


Figure 3. — Variation of EuroQol-5D-VAS score during follow-up. *: Paired t-test, $p=0.014$. ***: $p<0.0001$. ####: ANOVA, $p<0.0001$.

typical patient being a young man who had thrown a punch. This patient population is difficult and often has chaotic follow-up, as illustrated by the 20 patients we were unable to include. Unlike orthopedic treatment with strict immobilization and surgery, syndactyly minimizes medicalization of these patients. Within our Hand center, non-surgical patients historically benefited from a more cumbersome follow-up marked by low therapeutic compliance, with a thermoplastic intrinsic brace to maintain a total of six weeks. Given the results of syndactyly treatment published in the English-speaking literature^{8,10,18}, we decided to change our management by introducing syndactyly for a

maximum of fifteen days and a follow-up consultation for a maximum of three months.

The functional results we report support this management with a significant and early improvement in functional scores during follow-up. The QuickDASH score is halved between two and six weeks, confirming good patient recovery. They regain a QuickDASH score similar to that of the general population at twelve weeks of follow-up. The EuroQol-5D-VAS® follows the same variation with significant improvement from two weeks of follow-up, which continues up to twelve weeks. Responses to the five dimensions of the EuroQol-5D-5L® score show that fifth metacarpal neck fractures have a moderate impact on only two components: everyday activities and pain. For the three other modalities, over 90% of patients have no discomfort or only mild discomfort from two weeks. These data are consistent with the results of the clinical trial published by Pellatt et al.¹⁸, which shows an improvement in the QuickDASH score at six and twelve weeks after trauma, with no difference between a group of 62 patients treated with syndactyly and another group of 62 patients treated with a cast. Two clinical trials published by Van Aken et al. and Retrouvey et al. similarly concluded by reporting excellent functional results during syndactyly treatment^{19,20}.

The rapidly favorable evolution of functional scores that we report would allow for shortened medical follow-up. Gamble et al. report that “self-follow-up” management offers great patient satisfaction and very satisfactory QuickDASH and EuroQol® functional scores²¹. The data from our study corroborate these results. Two weeks after the trauma, patients present with moderate discomfort, compatible with the

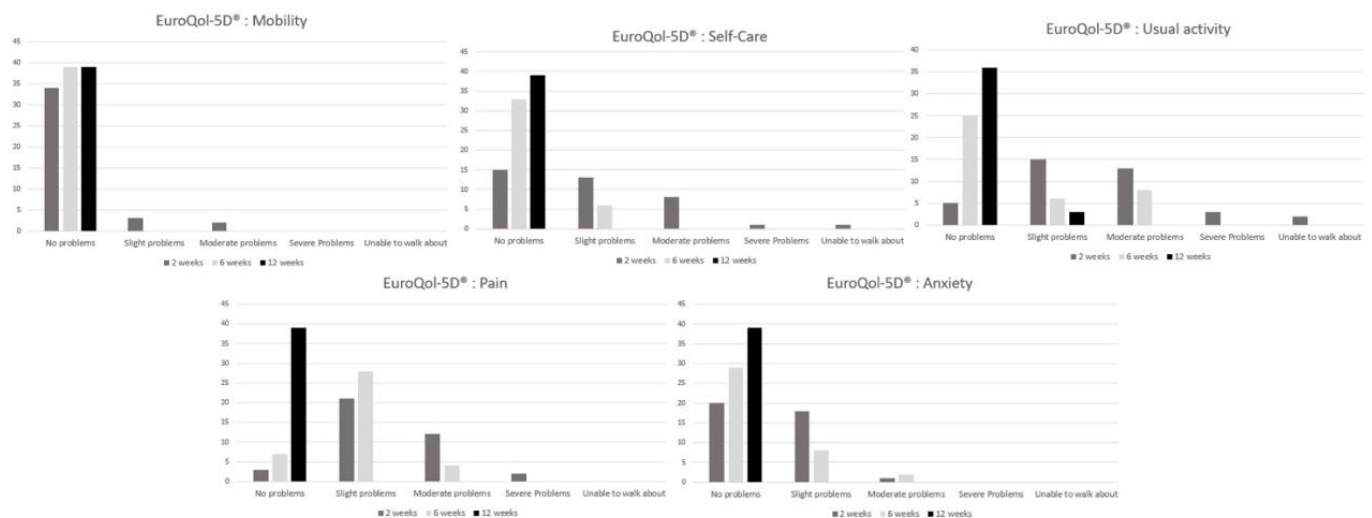


Figure 4. — Evolution of responses to the five dimensions of the EuroQol-5D-5L score during follow-up.

Table III. — Variation of the 5 dimensions of the EuroQol-5D® score during the follow-up of the 39 patients.

Dimension	Two weeks N=39	Six weeks N=39	Twelve weeks N=39	Variation 2-6 weeks*	Variation 6-12 weeks*
Mobility**					
No problems	34 (87)	39	39	NS***	NS
Slight problems	3 (8)	0	0		
Moderate problems	2 (5)	0	0		
Severe problems	0	0	0		
Unable to walk about	0	0	0		
Self-Care**					
No problems	16 (41)	33 (85)	39	P=0,001	NS
Slight problems	13 (34)	6 (15)	0		
Moderate problems	8 (21)	0	0		
Severe problems	1 (2)	0	0		
Unable to walk about	1 (2)	0	0		
Usual activity**					
No problems	5 (13)	25 (64)	36 (92)	P=0,030	P=0,005
Slight problems	16 (41)	6 (15)	3 (8)		
Moderate problems	13 (33)	8 (21)	0		
Severe problems	3 (8)	0	0		
Unable to walk about	2 (5)	0	0		
Pain**					
No problems	4 (10)	7 (18)	39	P=0,014	NS
Slight problems	21 (54)	28 (72)	0		
Moderate problems	12 (31)	4 (10)	0		
Severe problems	2 (5)	0	0		
Unable to walk about	0	0	0		
Anxiety**					
No problems	20 (52)	29 (74)	39	NS	NS
Slight problems	18 (46)	8 (21)	0		
Moderate problems	1 (2)	2 (5)	0		
Severe problems	0	0	0		
Unable to walk about	0	0	0		
* Fisher's exact test. **N(%). ***NS : not significant.					

performance of daily activities. Our study shows that improvement in QuickDASH and EuroQol-5D-VAS® is constant from two weeks onwards. Reduced follow-up with a follow-up consultation at two weeks to check for good initial progress would be sufficient. The implementation of this reduced follow-up would have saved our center the need for 78 specialized consultations and 156 X-rays²². Some authors describe a more radical approach with no specialized follow-up after explanation of the treatment and expected evolution in the emergency department^{21,23}.

Our study reports an average off-work period of 21.8 ± 1.5 days, similar to the duration of 22 days reported

by Van Aken et al.¹⁹. Minimal time away from work is a major goal in the treatment of these fractures, which have a predominantly favorable evolution⁷. Surgical treatments with pins or plates do not allow for such results as osteosynthesis is most often followed by at least three weeks of immobilization⁴. Facca et al. report an average off-work period of 7.1 and 8 weeks for plate or pin osteosynthesis²⁴. In the case of pins, secondary removal of the material at 6 weeks must also be taken into account⁶. Orthopedic treatment with splint or cast is also inherently incompatible with such a result⁹. Syndactyly allows us to overcome these limitations. The reduction in work duration in cases of treatment

by syndactyly can be even more ambitious. Pellatt et al. report an average duration of 0 days in cases of syndactyly treatment¹⁸. However, this duration is difficult to generalize to our French population, which benefits from a different healthcare system. Our study includes a majority of manual laborers who were able to quickly return to work without limitation. It should be noted that five patients did not wish to be stopped and immediately resumed their professional activity with syndactyly. This would have been impossible with strict immobilization or surgery.

Our study has several limitations. Its retrospective design does not allow for data collection control. However, this is limited by the fact that we only used objective data with EVA, QuickDASH, and EuroQol-5D-5L® scores. A limiting factor of our study is that we did not study strength data such as grip strength. This is due, in part, to the fact that we do not routinely perform these measurements and that the retrospective nature of our study did not allow us to intervene on this data. Our series only includes 39 patients, which may seem small. However, we only selected patients who had complete follow-up and therefore filled out all questionnaires. This makes the analysis of the results of our study relevant.

CONCLUSION

Treatment of fifth metacarpal neck fractures with an anterior angulation of <70 degrees using syndactyly for fifteen days allows for good functional results as early as two weeks after the trauma. These results continue to improve at six and twelve weeks of follow-up. Return to work is early, with an average of 3 weeks, even for those with physically demanding jobs. Our study supports a short medical follow-up with a single control consultation at two weeks, which would allow these patients to maintain their professional and social lives.

Conflict of Interest: The authors declare that they have no conflict of interest.

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