

# Isolated fat pad sign in acute elbow injury: is it clinically relevant?

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An isolated fat pad sign (i.e. joint effusion without a visible fracture), commonly seen in acute elbow injury, is associated with occult fracture and treated as such. However, the clinical relevance of an isolated fat pad is unclear, thereby questioning the need for specialized follow-up. In this study, 111 patients (median age 15 years, interquartile range 9–27 years) with an isolated fat pad sign after acute elbow injury were included. The clinical relevance of an isolated fat pad sign was derived from descriptives on pain, elbow function, treatment change, number of revisits and recovery time after 1 week follow-up and long-term follow-up. Treatment alterations were rarely made and none of the patients needed an operative intervention; also, none of the patients had persistent symptoms. The median recovery time was 3 weeks (interquartile range 2–12 weeks). This study shows that,

unless symptoms persist or worsen, regular follow-up at a specialized outpatient clinic is not needed. *European Journal of Emergency Medicine* 23:228–231 Copyright © 2016 Wolters Kluwer Health, Inc. All rights reserved.

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## Introduction

An isolated fat pad (i.e. joint effusion without a visible fracture) on radiography is diagnosed in 4–32% of patients with acute elbow trauma presenting at the Emergency Department (ED) [1–3]. Although previous studies indicate that an isolated fat pad sign is associated with a fracture [4], only a few and small studies have examined its clinical relevance [3–6]. Some studies showed prolonged recovery time compared with patients without an effusion or fracture [3,5] and in one small study of 13 patients, two patients with an isolated fat pad required surgery after additional MRI [6]. Others reported, however, that missing of fractures in patients with an isolated fat pad had no consequences on recovery time, treatment or patient outcome [4,7]. Currently, the common practice in the Netherlands is to treat this condition with elbow elastic bandage and broad arm sling or (rarely) with analgic cast immobilization. Patients return to specialized outpatient clinics for follow-up by a trauma or an orthopaedic surgeon. In the absence of evidence on the clinical relevance of an isolated fat pad sign, it is unknown whether this expensive regular follow-up is required.

The aim of our study is to assess the short-term and long-term clinical relevance of an isolated fat pad sign in our ED patients with acute elbow injury. In addition, we will evaluate the factors that could possibly influence recovery time.

## Methods

### Setting and participants

This is a substudy of the Extension trial, a prospective observational study in 587 patients with acute elbow

injury that was carried out in the two ED locations (~45 000 annual visits) of the St Antonius Hospital in the Netherlands [8]. Approval was obtained from a local ethics committee ('Lokale Toetsing Medische Experimenten', reference number Z\_10.07).

All patients with acute elbow injury were considered for inclusion. Exclusion criteria were age less than 3 years, previous traumatic/chronic condition of the elbow, multi-trauma, no informed consent, no history of trauma, trauma more than 72 h old, neuromuscular disease, suspicion of intentional injury, osteogenesis imperfecta and altered mental status. After inclusion, all participants received anterior–posterior and lateral elbow radiographs. The formal radiologist's report served as the reference standard.

### Test methods

Patients with an isolated fat pad sign [large anterior fat pad (sail sign) and/or posterior fat pad] were treated according to the local protocol, that is, elastic bandage with broad arm sling or analgic cast immobilization. The primary goal was to evaluate the short-term and long-term clinical relevance of an isolated fat pad sign.

For short-term follow-up, every participant was asked to return to the specialized outpatient clinic of a trauma surgeon after 1 week. Progress of pain (by Numeric Rating Scale; '0' = no pain, '10' = most intense pain imaginable), elbow range of motion and treatment change were noted.

For long-term follow-up, chart review and telephonic assessment was performed in all patients with an isolated fat pad. Using a standardized questionnaire, information on the number of return visits (at the outpatient clinic, ED, GP, physiotherapist or other hospital) and treatment changes was collected. In addition, duration of recovery (i.e. no pain and/or movement restrictions that prevent patients from carrying out their daily activities) and persistent symptoms (if any) were noted.

The secondary goal was to evaluate the factors that could possibly influence recovery time (age, sex and pain score at ED). Missing data are described.

### Statistical methods

Data were analysed using the statistical package for the social sciences, IBM SPSS Statistics for Windows, Version 21.0 (IBM Corp., Armonk, New York, USA). Descriptive statistics were used for the primary outcome. The Spearman correlation test (for nonparametric continuous variables) and the Mann–Whitney test (for nonparametric categorical variables) were used for secondary outcome.

## Results

### Patient baseline characteristics

Out of 587 patients with acute elbow trauma, 111 patients (19%) had an isolated fat pad [median age 15 years, interquartile range (IQR) 9–27 years; 52% male; median pain score at ED presentation 3, IQR 3–5]. There were 60 (54%) children less than 16 years old (median 10 years, IQR 7–12 years) and 51 (46%) adults of 16 years old or more (median 30 years, IQR 19–54 years). Age cutoffs are in line with previous studies [1,2].

Treatment at the initial ED visit consisted of application of elastic bandage in 106 patients. Four patients were treated with an elbow cast because of severe pain and one patient received no treatment on the doctor's discretion.

### Short-term follow-up at outpatient clinics after 1 week

Ninety-two patients (83%) returned to the trauma surgeon outpatient clinics for follow-up 1 week after the ED visit. Seventy-seven patients (77/92 = 84%) had no or less pain and no movement restriction. Only one (1/92 = 1%) patient (see Fig. 1) switched from elastic bandage to cast immobilization because of more pain. Follow-up radiography was performed in five (5/92 = 5%) patients because of suspected fracture. No abnormalities other than haemarthrosis were encountered and no changes in management were made.

Nineteen patients (17%) were lost to short-term follow-up, of whom 18 (18/19 = 95%) were initially treated with elastic bandage and one (1/19 = 5%) received no treatment on doctor's discretion. Thirteen out of 19 patients (68%) were reached for telephonic assessment: 10 (10/13 = 77%) patients did not consult for professional

care, two (2/13 = 15%) patients visited their GP for checkup (not because of more pain or movement restriction; no treatment changes) and one (1/13 = 8%) patient went to a physiotherapist on their own initiative. Six out of 19 patients (32%) were lost to short-term follow-up and could not be reached for telephonic assessment. Patient chart review showed no ED returns.

### Long-term follow-up: patient chart evaluation and telephonic assessment

All patient charts (100%) were evaluated for return visits and 95 patients (86%) were reached for telephonic assessment. In total, information on long-term follow-up was available in 100 patients (90%). A summary of the findings is reported in Fig. 2. The median time interval from ED presentation to telephone call and patient chart evaluation was 22 months (IQR 17–31 months).

### Return visits at professional care

Nine (9/100 = 9%) patients visited the outpatient clinics because of persistent pain or movement restrictions. There were no revisits at the ED and five (5/100 = 5%) patients went to their GP. No treatment alterations were made in any of these patients. In total, five (5/100 = 5%) patients underwent physiotherapy: two on the basis of a specialist's referral (three and 12 visits) and three on their own initiative (2, 3 and > 20 visits).

### Duration of symptoms

None of the patients with long-term follow-up data had persistent symptoms that prevented patients from carrying out their daily activities (see Table 1). The median recovery time was 3 weeks (IQR 2–12). Children recovered faster than adults [median recovery time 2 (IQR 2–4) weeks vs. 6 (IQR 2–18) weeks;  $P < 0.0001$ ]. Males recovered faster compared with females [2 (IQR 1.8–4) weeks vs. 5 (IQR 3–12) weeks;  $P < 0.0001$ ]. Pain score at ED presentation was not significantly correlated with the duration of symptoms.

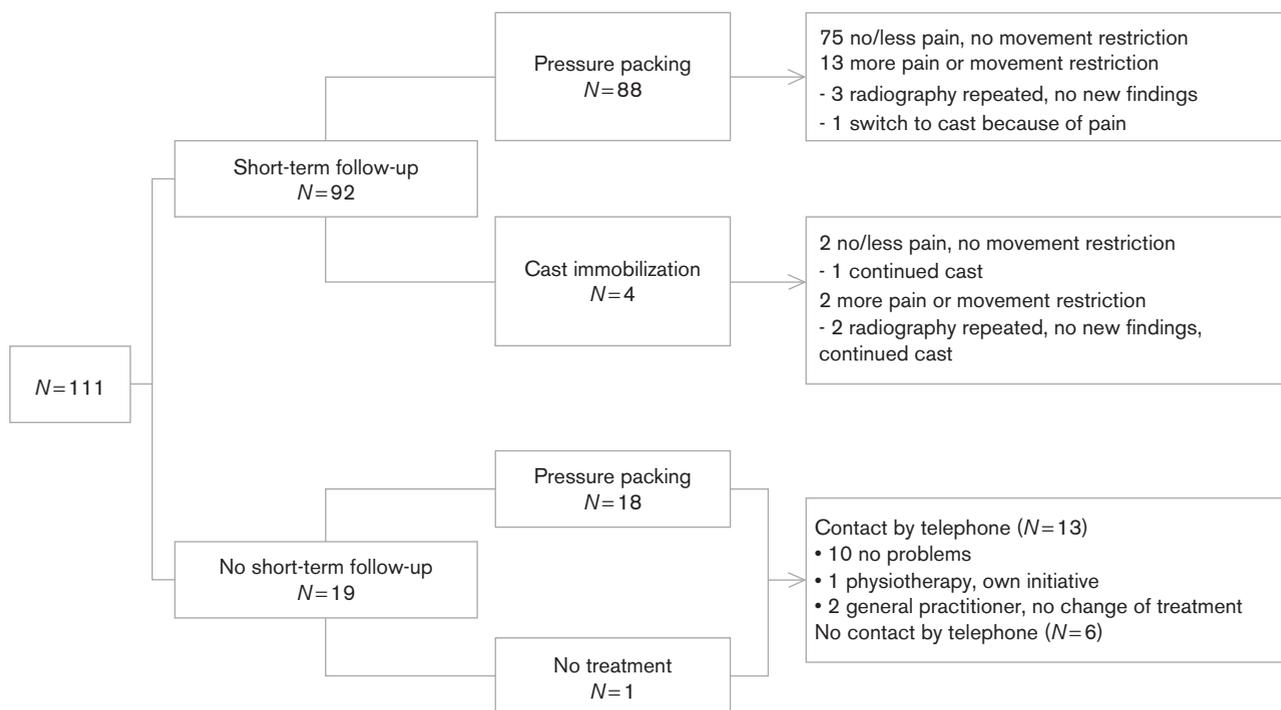
### Limitations

Our study is limited by its retrospective design on long-term follow-up. Recall bias and subjective telephonic assessment complicated the estimated duration of symptoms. Short-term follow-up was missing in 17% of patients and information on long-term follow-up was not available in 10%. Moreover, this study was a convenience sample derived from the Extension trial, and was therefore not subject to sample-size calculation. Whereas this is the largest study on isolated fat pad relevance thus far, the study should ideally be of a larger sample size and have a prospective and multicentre design.

### Discussion

To our knowledge, we are the first to evaluate the clinical relevance of an isolated fat pad after acute elbow trauma

Fig. 1



Short-term follow-up at outpatient clinics after 1 week.

by short-term and long-term follow-up in a large number of patients. In line with previous small studies [4,5], none of our patients had persistent symptoms that prevented patients carrying out their daily activity. None of the patients required surgery and change of treatment was rare. Only one patient (0.9%) switched from elastic bandage to cast immobilization because of pain and five patients (4.5%) underwent physiotherapy.

This was a substudy of the Extension trial [8], in which almost 20% of patients with acute elbow trauma had an isolated fat pad. This incidence is comparable with previous studies [1], but higher compared with others (4–9%) [2,9]. Several factors may have contributed towards this difference. The subjective diagnosis, imaging quality and study sample size may have played a role. Moreover, in some studies, radiography was not performed in every patient, thereby possibly underestimating the incidence of an isolated fat pad [9]. However, incidence at our Dutch ED might be overestimated because, in addition to self-referrals, GPs refer patients with suspected fracture to the ED, thereby increasing the proportion of patients with more severe elbow injury.

We observed faster recovery in children compared with adults. Interestingly, we also found that men recovered faster than women. Possibly, there is a sex difference in the reporting of subjective conditions. Moreover, women may suffer more often from other disabling conditions

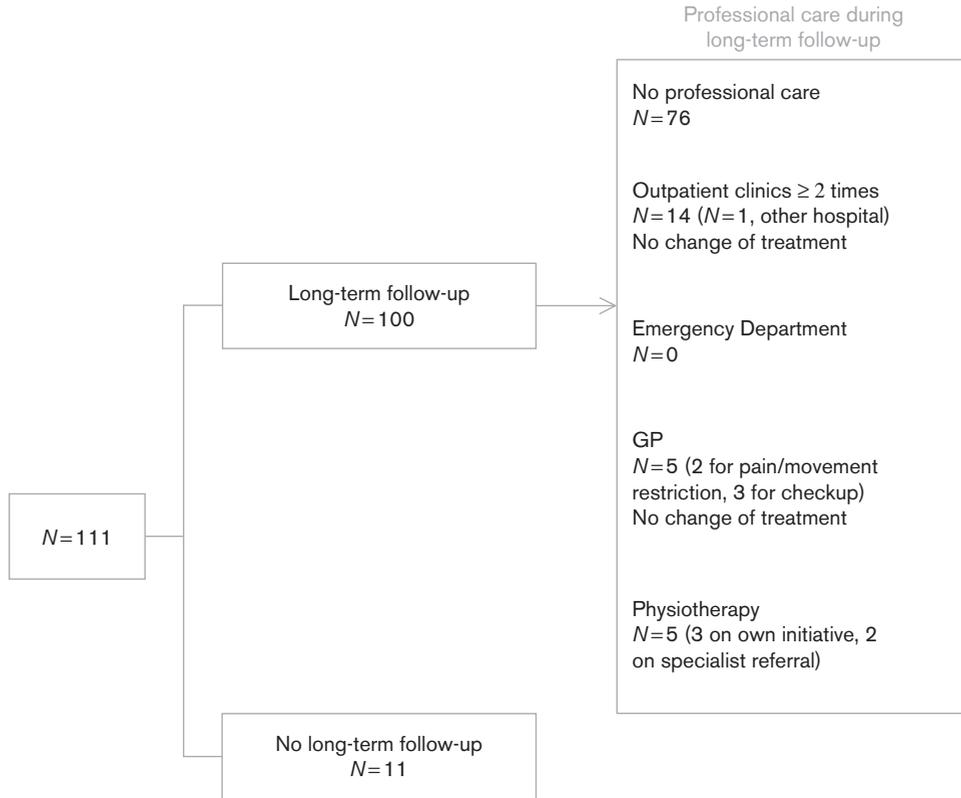
such as arthritis, thereby enhancing self-reported disability [10]. However, thus far, predictors of functional recovery after elbow trauma are lacking. It should be noted that our long-term follow-up is of a retrospective and subjective nature, thereby limiting definite conclusions.

As treatment adjustment is rare in patients with an isolated fat pad sign, it can be questioned whether patients need regular follow-up at expensive specialized outpatient clinics. Absolute recommendations on the need for specialized outpatient clinic follow-up cannot be made, but data suggest overtreatment of this patient category.

### Conclusion

Our data suggest that patients with an isolated fat pad sign after acute elbow trauma do not require regular follow-up at expensive specialized outpatient clinics. The majority of patients recovered rapidly, there was rarely a change in management and none of the patients had persistent symptoms. We would recommend that appropriate instructions and advice must be provided at the ED. Only if symptoms persist or worsen is follow-up indicated and additional radiographs, physiotherapy or a change in management (e.g. cast immobilization) may be required. Ideally, this change in follow-up should be assessed in a large prospective multicentre study.

Fig. 2



Long-term follow-up on the basis of chart review and telephonic assessment.

Table 1 Duration of symptoms

	n (%)
≤ 3 months	83 (86)
6 months	8 (8)
9 months	3 (3)
12 months	3 (3)
Total	97 <sup>a</sup> (100)

<sup>a</sup>Three patients could not recall duration of symptoms.

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**Conflicts of interest**

There are no conflicts of interest.

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