



A randomized trial of 'soft cast' for distal radius buckle fractures in children

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A buckle fracture is a stable fracture where there is a dorsal cortex compression of the distal radius. A total of 117 children with buckle fracture treated at our institution were randomised prospectively into two treatment groups : soft cast or rigid cast. The rigid cast group attended clinic after three weeks for removal of the cast. In the soft cast group, the cast was removed by parents at home after three weeks. Telephone follow-up was carried out after 4 to 5 weeks post fracture. Both groups had full recovery as compared to the uninjured side and parents were satisfied with the treatment. Only one patient in the soft cast group had a problem as compared to 5 in the rigid cast group ($p = 0.035$, using chi square test). When given a choice, parents of children in both groups opted for future treatment with a soft cast ($p < 0.01$ using chi square test). Our study showed that buckle fractures of the distal radius can safely be treated with a soft cast without the need for more than one fracture clinic appointment.

Keywords : distal radius fracture ; torus fracture ; children ; soft cast.

INTRODUCTION

Torus or buckle fractures are the most common forearm fractures in children (4). They are due to failure of the cortex on the compression side and normally occur in between the woven metaphysis and lamellar diaphysis (5). Various treatment options include rigid cast (4), soft cast (3), soft

bandage (8), back slab and splints (1). Treatment by a rigid cast is mentioned in most standard texts but it is heavy and bulky and requires a second visit for cast removal, radiographs and clinical examination (1,4). Back slabs were found to become loose in 22% (9/41) of cases (5).

Soft cast is a synthetic semi-rigid cast which allows some movements of the joints to avoid stiffness (3) and is more secure than splint / cast slab. It can be removed at home with bandage scissors. West *et al* (8) recently proposed soft bandage treatment of these fractures. They also observed that parents feel more confident if fractures are treated by full cast as compared to soft bandage (8).

Presently we are treating all buckle fractures of the distal radius at Our Lady's Hospital for Sick

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Children (OLHSC), Dublin with soft cast. The aim of this study was to compare the treatment of buckle fracture with soft cast versus rigid cast.

PATIENTS AND METHODS

From July 2004 to October 2004, 131 children sustained buckle fractures of the distal radius and attended the Accident and Emergency Department of OLHSC, Dublin. They had anteroposterior and lateral radiographs of the distal radius and were treated with back slabs initially. They were referred to the fracture clinic which they attended after one to three days.

The diagnosis of buckle fracture and its stable nature was explained to the parents in the fracture clinic. Three patients were excluded because their parents were unwilling to participate in the study and the remaining 128 patients were included in this prospective study following parental consent.

Patients were randomised into two groups on the basis of the month in which they attended the fracture clinic. The children with buckle fractures attending in July and August 2004 were treated with below-elbow soft cast (Cellacast) and those attending in September and October 2004 were treated with below-elbow rigid cast.

Parents of both groups were given cast instructions. The rigid cast group were called back after three weeks for removal of the cast and to start mobilisation. Parents of the soft cast group were given emergency telephone numbers and instructions for removal of cast. They were advised to remove the cast and start mobilisation in three weeks time. Parents of both groups were interviewed with a telephone questionnaire after four to five weeks post fracture. They were asked about any cast problem, clinical appearance and range of movement of the wrist as compared with the normal side. Any complication and the return to normal activities were also noted. Parental satisfaction with the treatment was assessed on a scale from 1 to 10 where 1 was unsatisfactory and 10 showed high satisfaction with the treatment. They were also asked about their future choice of treatment (figs 1-4).

RESULTS

A total of 117 questionnaires were completed. There were 69 children in the soft cast group and 48 in the rigid cast group. There were 68 boys and 49 girls, ranging in age from 2-12 years with a



Fig. 1. — Lateral radiograph of torus or buckle fracture



Fig. 2. — AP radiograph of torus fracture

mean age of 5 years. Sixty five (56%) of the injuries were of the left distal radius. Non-dominant hand injuries were in 62 (53%). The mechanism of injury was a fall while running in 87 (74.3%), fall from a height in 16 (13.7%), fall of a bicycle in 8 (6.8%) and 6 (5.1%) were miscellaneous. Both groups had recovery with full range of movement as compared to the uninjured side.

Analysis of parental satisfaction with the treatment showed both groups were highly satisfied. Parents experienced some problems with the casts, 5 (10.4%) in the rigid cast group and 1 (1.4%) in the soft cast group ($p = 0.035$ using chi square test).

When parents were asked, if in future they have a choice of treatment of soft or rigid cast, a highly significant difference was found between the two groups as 68/69 in the soft cast group and 3/48 in



Fig. 3. — Application of below elbow soft cast



Fig. 4. — Below elbow soft cast for torus fracture treatment

Table I. — Summary of Results

Type of cast	Number of patients	Cast complications	Parental Preference for same cast
Soft Cast	69	1/69	68/69
Rigid Cast	48	5/48	3/48

the rigid cast group preferred the same treatment ($p < 0.01$ using chi square test) with strong preference to soft casting (table I).

DISCUSSION

There is still a variation in the treatment of buckle fracture of the distal radius in children (1). Treatment in most standard texts is immobilisation in a standard forearm cast for three weeks (4). Studies have shown that a torus fracture is stable (1,2,5,7) and follow-up radiographs are not required (1,2,8) because the tension side of the cortex remains intact and should thus not deform (4).

Recent studies recommend treatment of these fractures with removable splints or back slabs (1,5-7). However a high rate of loosening of 22% (9/41) was reported in this treatment, requiring further application of the splint or back slab by parents, and one patient attended hospital for this reason (5).

Recently West *et al* (8) have compared soft bandage and plaster cast treatment for these fractures.

They recommended soft bandage treatment with quicker return of function than with plaster cast treatment, but also mentioned that the parents were happier to accept plaster cast treatment than soft bandage.

In our study we compared soft cast with rigid cast treatment. The benefits with soft cast are that it allows some movement across the joint and can be removed at home with bandage scissors.

Buckle fracture is a common paediatric fracture and can add burden to the fracture clinic if unnecessarily reviewed in clinics (1). Soft cast treatment reduces this burden with the 'One Stop treatment'.

In our study both groups had complete recovery with full range of movement as compared to the uninjured side and children went back to normal daily activities. Analysis of parental satisfaction with the treatment showed both groups were highly satisfied, when given choice, 68/69 (98.55%) parents in the soft cast group preferred to have soft cast treatment and one clinic appointment, as compared to 3/48 (6.25%) parents in the rigid cast group had some preference for rigid cast treatment, a highly significant difference ($p < 0.01$). These three parents in the rigid cast group were not sure as they had no problem with the treatment and had no experience with the soft cast.

Two parents in the rigid cast group felt the cast was heavy and bulky and three parents mentioned tightness around the thumb. One parent in the soft

cast group felt anxious about mobilising her child's wrist herself after three weeks.

Although soft cast may be more expensive, the results of this study show greater satisfaction with the soft cast. Advantages of one visit to the outpatient department are less time off school for children, less time off work for parents, released clinic spaces for other patients (a cost benefit) and the negative effects of children's visits to hospitals are minimised. Patient distress of using noisy saw for removal of cast by standard techniques is reduced (3).

We thus conclude that soft cast is the treatment of choice for buckle fractures.

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