Torus (buckle) fractures of the distal radius are common in childhood. Based on the results of a postal questionnaire and a prospective, randomised trial, we describe a simple treatment for this injury, which saves both time and money.

Over a six-month period, we randomised 201 consecutive patients with this injury to treatment with either a traditional forearm plaster-of-Paris cast or a ‘Futura-type’ wrist splint. All patients were treated for a period of three weeks, followed by clinical and radiological review.

There was no difference in outcome between the two groups, and all patients had a good result. Only one patient did not tolerate the splint which was replaced by a cast.

The questionnaire showed a marked variation in the way in which these injuries are treated with regard to the method and period of immobilisation, the number of follow-up visits and radiographs taken.

We suggest that a ‘Futura-type’ wrist splint can be used to treat these fractures. The patient should be reviewed on the following day to confirm the diagnosis and to give appropriate advice. There is no evidence that further follow-up is required.

This simple treatment has major benefits in terms of cost and reduction of the number of attendances.

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Fractures of the distal radius in children are very common and constitute a considerable part of the workload of a paediatric fracture clinic. While certain types of fracture have a high rate of complications and require careful monitoring, others do not.

Torus, or buckle, fractures (Fig. 1) are defined as a compression failure of bone and normally occur in the transitional zone between the woven metaphyseal and lamellar diaphyseal bone. They are common in the distal radius and show little or no tendency to displace. This injury is distinct from the greenstick fracture in which there is failure on the tension side of the bone and displacement can occur with time.

Most standard texts state that immobilisation in a standard forearm cast for three weeks is appropriate. 2-5 There is considerable variation in the treatment of these fractures, between different hospitals and consultants. One method involves the application of a forearm cast for three weeks with a repeat visit for its removal and clinical and radiological examination. Another is the application of a ‘Futura’ type wrist splint (Fig. 2) and appropriate advice with discharge after the first visit. The latter, if appropriate, has considerable benefits in terms of cost and a reduction in the number of attendances. It is also more convenient for the patient and parents. We have compared these two methods.
methods and attempted to quantify the advantages of changing to the ‘Futura’ splint if appropriate.

Patients and Methods

Postal questionnaire. We sent a questionnaire to 104 members of the British Society for Children’s Orthopaedic Surgery (BSCOS) excluding those who worked in our centre, to ascertain the incidence of this type of fracture and the methods of treatment. We enquired specifically as to the type of treatment undertaken in the Accident and Emergency Department (AED), whether and when the patients were seen in the fracture clinic, whether treatment was changed in the clinic and if further radiographs were obtained. We also enquired about the length of treatment and whether further review and follow-up radiographs were undertaken.

Prospective, randomised trial. Over a six-month period, 201 patients with torus fractures of the distal radius attended our fracture clinic. Of these, 107 (53.2%) were boys and 94 (46.8%) were girls, with a mean age of 8.9 years (2 to 15). There were 82 fractures of the right radius and 119 of the left. We treated these injuries either by a standard plaster-of-Paris forearm cast or by a ‘Futura-type’ splint.

The patients were initially seen in the AED where the diagnosis was made from a radiograph. The fracture was immobilised by a metal splint held in place with a crepe bandage according to the protocol of the AED and the patients were referred to the fracture clinic. They were randomised into two groups depending on the day on which they attended the clinic, which was usually the day after injury. The treating doctor confirmed the diagnosis, the plaster-of-Paris cast or Futura splint was applied and a follow-up appointment made for three weeks later. The cast used was a standard full ‘Colles type’ plaster applied by a plaster technician. The Futura splints were sized and fitted by the doctor or nurse. At follow-up the cast or splint was removed, and clinical examination and radiography undertaken. The patient and parents were questioned to ensure that there had been no problems associated with the treatment. If there had been no complications the patient was then discharged.

Cost-benefit analysis. The contracts department of the hospital supplied the costs of the different resources used in the treatment of this injury and the cost of the two methods of treatment was calculated.

Results

Postal questionnaire. Of the 104 questionnaires sent out, we received 71 replies (68.3%); of these 65 dealt with this type of injury and were analysed. The mean number of these fractures seen per week was 5.1 ± 4.8 for each consultant. Of the 65 consultants, 62 (95%) stated that the injuries were seen in the fracture clinic at a mean of 1.1 ± 3.6 days after injury. In the AED, 48 consultants (73.8%) used plaster-of-Paris backslabs, 16 (24.6%) used full plaster-of-Paris casts and one (1.5%) used wrist splints. After the child had been seen in the clinic these figures altered to 18 (27.7%) plaster-of-Paris backslabs, 42 (64.6%) full casts and five (7.7%) wrist splints.

The fractures were immobilised for a mean of 2.9 ± 0.64 weeks (1 to 4), and 54 (83.1%) patients were reviewed again at a mean of 2.5 ± 1.3 (2 to 4) weeks after the initial visit. Two consultants said they routinely reviewed these patients on two further occasions.

Seven consultants (10.8%) stated that a radiograph was taken after changing the treatment at the initial visit and 11 (16.9%) took a radiograph routinely at the end of treatment.

Prospective, randomised trial. Of the 201 patients, 85 had a plaster-of-Paris cast and 116 a Futura splint. A total of 22 patients failed to attend for follow-up, four in the cast group and 18 in the splint group, leaving 179 in the study, 81 treated by a cast and 98 by a splint. Two patients were excluded, one because her parents requested treatment with a cast rather than a splint and one in whom at follow-up at three weeks it was noted that the fracture was of the greenstick type rather than a true torus fracture. Compliance with both types of treatment was good except in two very young patients who tried to remove their splints shortly after they had been applied. All fractures united clinically and radiologically with no loss of position.

Cost-benefit analysis. The costs of the different methods of treatment are shown in Table I.

Treatment in a cast which involved a radiograph in the AED, a temporary splint, attendance at the clinic, application of the cast and further attendance for its removal cost
Your child has sustained an injury to their wrist called a torus fracture. This can be considered to be little more than a ‘bone bruise’ and will not cause any long-term problems whatsoever. We have provided your child with a wrist support to make them more comfortable and to reduce the chances of further injury. Under normal circumstances we will not need to see your child again. They should keep this on for 3 weeks except for bathing. If your child removes the support before 3 weeks, simply re-apply it. When first removed after 3 weeks your child may complain of mild stiffness and aching. This is normal and will settle down quickly.

If your child still has problems 2 weeks after removing the splint or if there are any problems before then, please telephone us for advice or a further clinic appointment if necessary.

![Table I](#)

<table>
<thead>
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<th>Treatment</th>
<th>Cost (£)</th>
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<td>16.00</td>
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<tr>
<td>Clinic attendance</td>
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</tr>
<tr>
<td>Full plaster-of-Paris cast*</td>
<td>5.42</td>
</tr>
<tr>
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* the cost for this includes materials and the plaster technician’s time

![Table II](#)

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Discussion

Our questionnaire confirmed that this is a common injury. Each consultant estimated that on average they saw 265 cases per year. Our 201 patients were collected from four consultants in less than six months. The study took place during the autumn and winter and the number of fractures may be higher during the summer. Our study confirmed the benign nature of the condition. There were no complications suggesting that clinical and radiological follow-up is not required.

We found that both treatments were well tolerated. Patients and parents reported that they liked the fact that the splint could be removed for bathing and several said that the child had removed the splint before the end of the three weeks since the pain had settled. In two very young children there were problems with the child removing the splint at the beginning of treatment. This was easily remedied by applying a Tubigrip bandage over the splint until the child became accustomed to it, usually after one to two days. At first we had problems in obtaining splints to fit very young children, but the manufacturers provided us with a wide range of sizes on request (Fig. 2). Subsequently, we were able to fit splints to children as young as two years. Although the cost of a Futura splint is less than that of a plaster-of-Paris cast, the main advantage is that the child does not need to return to the clinic to have the splint removed, saving £53 per patient. If the 85 patients treated by a cast had had a ‘Futura’ splint this would have resulted in a total saving of £4505. The workload of the plaster technician, the number of patients attending the clinic and the time spent in the department by children and carers would also have been reduced.

The number of patients who failed to attend for follow-up was much higher in the splint group (18 of 116) compared with the cast group (4 of 85). This may be a reflection of the fact that a clinic visit is not necessary to remove the splint.

We have now adopted the following protocol for these injuries: 1) the diagnosis is made in the AED after taking a radiograph, and a splint is applied; 2) attendance is then required at the fracture clinic the next day to confirm the diagnosis, check that the splint fits properly, give instructions both verbally and in writing (Table II) and to discharge with open access if necessary.

We believe that this study has shown that the ‘Futura’ wrist splint is a safe and acceptable treatment of this very common injury. Considerable savings can be made in terms of cost and workload by discharging the patient, with appropriate instructions, after the first visit to the fracture clinic.

We wish to thank Mr J. Dorgan, Mr H. J. Walsh and Mr S. Nyagam for providing us with their patients for this study.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

References