

Distractor for Closed Nailing of Radius and Ulna

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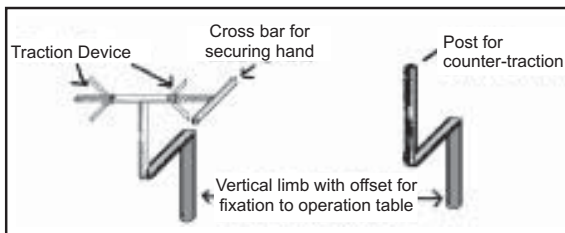
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Closed Nailing for fractures of the Radius and Ulna is a rewarding method of treatment with many advantages like less hospital stay, early union, less morbidity, and economy.

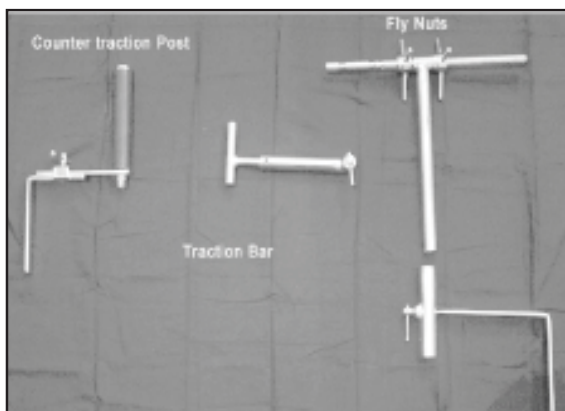
However, those who have tried closed nailing under IITV control know how difficult it is to hold the bones in alignment for closed nailing and this distractor was designed exactly for this purpose.

The Distractor

This indigenously designed piece of apparatus was based on principles similar to that of a Watson-Jones fracture table. It consists of a grip with screw attachment for securing the hand and a post for counter-traction.



Distractor schematic



Distractor actual



Distractor actual assembled



Distractor with patient (lateral)



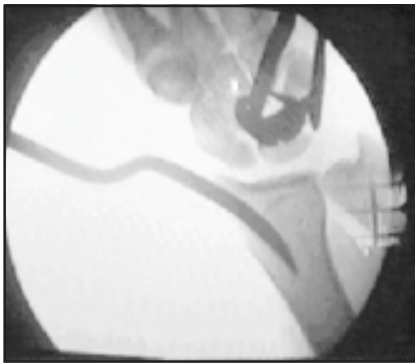
Distractor with patient (birds eye)



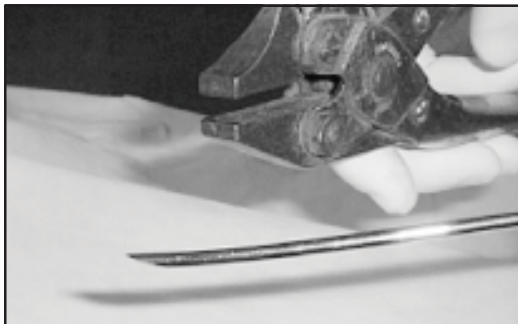
Distractor with patient



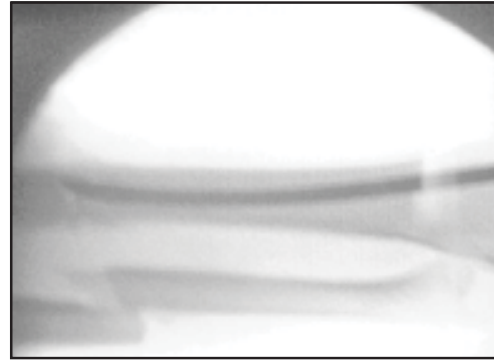
Instruments



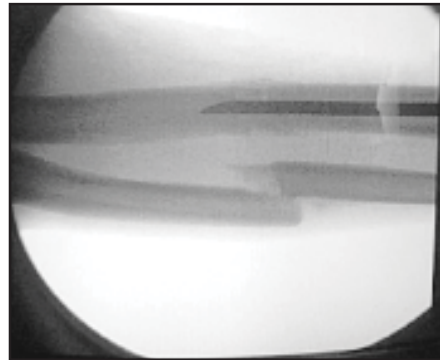
Step-1



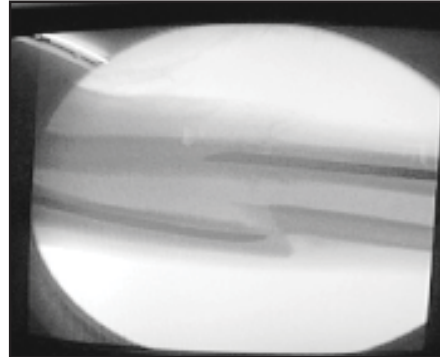
Step-2



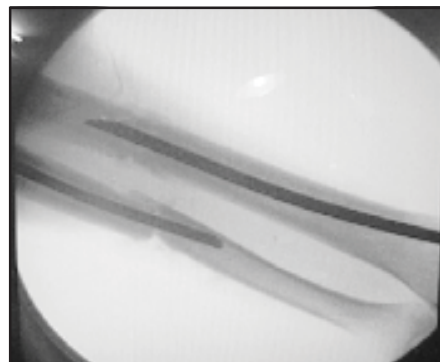
Step-3



Step-4



Step-5



Step-6

This apparatus can be fixed to the side railing of a conventional operation table with the help of two vice devices. If the operation table lacks the side railings, the same apparatus can be fixed onto a plywood board of 12-mm thickness and this can be put underneath the patient like a arm board.

Procedure

1. The patient is anaesthetized.
2. The post for counter-traction is padded heavily. The fractured forearm is positioned so that the post comes in the crook of the flexed elbow
3. In the supine position the hand of the fractured forearm is curled round the cross bar of the traction devise and firmly tied to it with a cloth bandage. It is necessary to see that the insertion point of the radius nail is left exposed.
4. Traction is applied to the forearm by turning the screws of the traction apparatus. It is recommended that the fracture position is checked repeatedly under IITV while traction is being applied, so that there is no risk of using excessive force.
5. The Cross bar of the traction apparatus can easily be rotated to all positions of supination and pronation so as to achieve best alignment at the fracture site
6. The C-Arm of the IITV can easily be maneuvered to see the forearm in two planes at rt. Angles (AP/Latte).
7. The forearm is prepped with savlon/spirit/betadine etc and draping is done to leave the forearm exposed.
8. Palpating the tip of the radial styloid chooses the entry site of the radius and a small longitudinal incision is taken. The entry hole is made with a small curved bone awl in the direction of the medullary canal. A Nail (Square/ Rush nail) of the correct length and diameter is chosen and its tip is bent slightly to facilitate negotiation in the canal.
9. The nail is advanced by gentle taps of the hammer or with pliers till it comes to the fracture site. The fracture position is confirmed once more in two planes by the IITV and the nail is advanced

across the fracture to engage the medullary canal of the other fragment. In this maneuver, help is taken of the fact that the nail can be rotated to change the direction of the bent tip. Also, the free hand of the operator can manipulate the fracture manually for reduction. The feel of the nail entering the medullary canal can best be experienced and with practice you can feel whether your nail is in the bone or in the soft tissue.

10. The position of the nail is reconfirmed by the IITV and the nail is advanced only a bit further at present.

11. The ulnar entry point that we now prefer is slightly lateral and distal to the tip of the olecranon. This has reduced the tendency of the ulnar nail to backtrack.

12. Fracture of the ulna is slightly easier to fix as it can be palpated subcutaneously.

13. Once the nails have both crossed the fractures, the traction is reduced and the nails seated to their full.

14. Both the ends of radius and ulna can be easily visualized to confirm proper seating of the nails.

15. The incisions are sutured and a plaster slab is applied.

Post-operative care

We usually discharge the patient as soon as he is fully awake and comfortable with instructions about exercising the fingers and shoulder. The dressing is changed if there is soakage.

A week later, the pop slab is removed and an Above-elbow plaster cast is given with the forearm in supination and the patient instructed on plaster care. The supine position of the forearm is recommended as this keeps the bones parallel and the interosseous membrane stretched out. Also, till full rotation returns after plaster removal, restriction of pronation can be compensated by shoulder abduction whereas incomplete supination cannot be substituted by any trick movement.

In stable transverse fractures with secure internal fixation, the plaster is kept for three to four weeks. If the fracture is unstable, or the fixation not as secure as desired, the plaster can be left for six to eight weeks. In the latter case, joint movements take longer to return, but in the long run, it has no effect on the ultimate range of movements.

Follow up X-rays taken at six weeks usually show woolly callus and it is safe to start gentle mobilization. Usually full function returns in three months. And the nails can be removed after bony radiological union.

Hints and Tips

1. Select cases with fractures in the middle 2/4th of the bones, or else it is difficult to get proper fixation.

2. Grossly comminuted fractures of both the bones are not suitable for fixation with unlocked nails.

3. Compound fractures upto Grade 3A can be managed but bone with the compound injury needs thorough debridement and takes longer to heal.

4. While nail is being introduced into the medullary canal, pay careful attention to the grating feeling that you constantly get. This is lost if the nail penetrates the cortex and enters the soft tissues. It is easier to do closed nailing by the feel rather than by constantly looking at the monitor of IITV.

5. To correct translational displacement, make use of the thumb of the free hand for digital pressure. If needed translation and rotational displacement of the radius can also be corrected by a K wire of 2 mm used as a joystick in the proximal fragment

6. Use the largest diameter nail that the canal will take. It may be of help to ream the canal in cases of doubt. Other than for children, you must put in at least a 2.5 mm nail.

7. For fractures at the junction of M/3 L/3 of the radius, fractures are better aligned if the radial entry point of the nail is taken medial to lister's tubercle. If still translation persists at the fracture site, a short segment of another nail can be jammed into distal fragment to fill in the wide medullary canal.

8. For an inexperienced surgeon, it is probably safer to plate a Galleazi/ Monteggia fracture than to nail. With experience, both these fractures can be managed by closed nailing most of the times.

9. Children with epiphysis that have not fused can be fixed with slender nails that enter distal to the ulnar, and proximal to the radial epiphysis, so that growth disturbances are avoided.

Advantages of the Distractor

1. Holds the forearm bones steady in position for nailing.

2. Fewer assistants are required.

3. Most of the times you can work outside the field of radiation of the IITV.

4. Steady traction can be maintained without operator fatigue.

5. Working area is left open and no hindrance to free access of the c-arm.

6. Economical and maintenance free.

Declaration

No monetary help / grant has been taken by the authors in development of the above apparatus. We have no commercial interest in the manufacture or sale of the distractor.

