

Case Series

Old but effective during this lockdown period a modified pin plaster technique to treat distal tibia fractures

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ABSTRACT

There are various methods for treating fractures of the distal tibia. The purpose of this study was to introduce a modified technique of 'pin in plaster' in treating the distal 1/3rd tibia fractures. Fifteen patients with fractures of the distal tibia AO classification A1 and A2 were followed for one-year post-application of the cast. Patients were excluded if they had complicated fractures or grade III b fractures or crush injuries, with multiple injuries or any pathological fractures or with any nerve or vascular injuries. Range of movement and functional results were calculated periodically at the 3rd and 6th months. Three cases developed pin tract infection in the study, all of which were treated with oral antibiotics successful. The fibula was fixed with plating in selected cases There were no cases of nerve injuries and no cases of tendon injury. All the cases that were treated were successful and completely weight-bearing by the end of the 4th month. Our modified technique is simple quick and effective to restore anatomic congruity and maintain the reduction in fractures of the distal tibia.

Keywords: Pin plaster, COVID trauma treatment, Fracture tibia, Casting with pins, Emergency pin, Steman pins

INTRODUCTION

The technique is technically less demanding and easier to undertake. This technique offers sufficient stability and support to fracture. There are several conservative and operative treatment methods for fractures of the distal tibia, including casting, percutaneous pinning, external fixation, and internal fixation with a plate or combined with external fixation. Cast immobilization is suitable for minimally displaced or non-displaced stable fractures and displaced stable fractures, and may be used for patients who cannot tolerate surgery.¹ The capability of immobilization with the cast for maintaining a reduction in comminuted fractures which is controversial.² This controversy indicates the effort to develop alternate approaches, like surgical procedure, which gives more

precise reduction and dependable fixation to fractures.³ An external fixator is a suitable option for extremely unstable and comminuted fractures. Ligamentotaxis helps to maintain the reduction in this technique. Our technique Pin and plaster is a faster and technically less demanding procedure than others.⁴

This is a combination of pinning, casting, and external fixation which lets treating fractures with very minimal devascularisation of the treating bone.⁵

This study was conducted to explain an altered technique 'pin in plaster' which is a promising treatment alternative for unstable or comminuted stable fractures of the distal 1/3rd tibia.

CASE SERIES

Surgical technique used

We studied 15 patients, mostly with distal 1/3rd fractures of the tibia and fibula, with COVID who received pin and plaster between November 2019 and November 2020. Exclusion criteria pathological fractures, multiple injuries, and fractures that were treated more than seven days after injury, fractures with neurovascular injuries, comminuted grade IIIB injuries and patients with no proper follow-up. According to the AO classification, there were A1 and A2 type fractures. The ethics committee approved the study and informed consent was obtained from all patients.

Operative technique

All surgeries were performed under strict aseptic conditions under spinal anaesthesia. C-arm was used to confirm the placement of the pins and reduction of the fracture.⁶

Proximal pin placement

The entry point was made with a stab incision through the skin. A Steinmann pin was equipped on drill and was incorporated at about 2 cm below tibial tuberosity. At its exit site on the opposite side, made a small stab incision over the skin and pulled the pin adequately. After placing the pin, we made sure there was no stress over the skin at both entry and exit points. If tension was identified then we extended the incision little as necessary. The risk of displacement in an unstable fracture where a stable approximation at the fracture ended was difficult, in such cases approximation can be achieved by passing Steinmann pins through the tibia proximally and distally to fracture and manipulated it and stabilized the fracture.

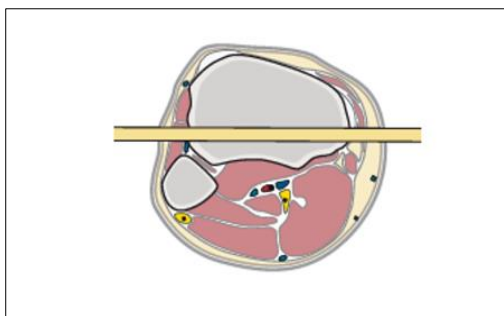


Figure 1: Insertion of the proximal pin.

Distal tibial pin placement

Distal tibial pin placement anterior tibial artery and vein positions had to be properly identified before placing the distal pin hence this area was a little complicated to place the pin percutaneous in this region. The pin was inserted from lateral to medial across the middle of the tibia and anterior to the fibula, in the frontal plane, in such a way

that it appeared medially via a subcutaneous surface of the tibia or into the calcaneum.

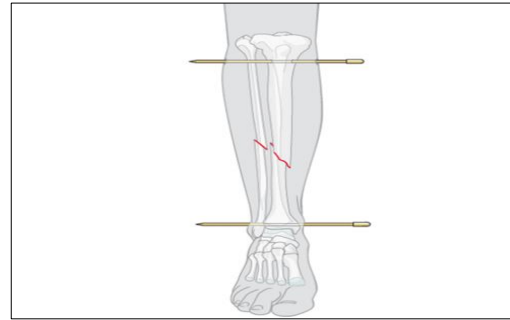


Figure 2: Proximal and distal pins with fracture fixation.

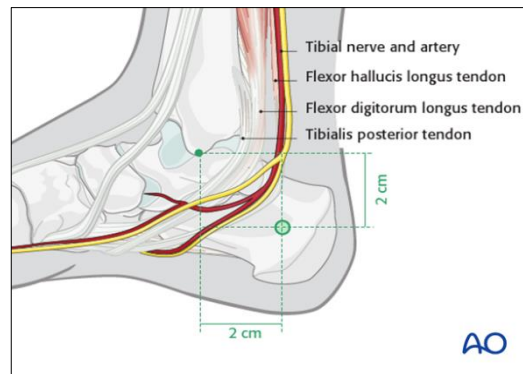


Figure 3: Distal pin insertion points.

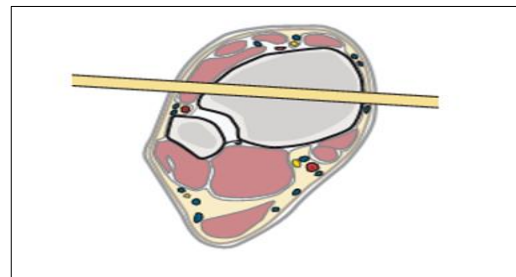


Figure 4: Distal pin insertion site.

Plastering

The skin should not be in tension around the pin entry with sterile dressing around the pin site. The cast was applied smoothly by incorporating the pin on either side with a thick plaster of Paris around each pin. Care was to be taken not to pull the plaster tightly from one end to the other, to make sure that there was no extra pressure on the skin around the pins. In case of excessive pin length, it can be cut with a pin cutter, so that the pin should be incorporated in the plaster, both medially and laterally.

It must be noted that these transfixion pins can be used for reduction.⁷ Traction along with rotatory, and angulation at the fracture site can be corrected. All these corrections

were to be done before the application of the cast. With the fracture held in reduction, the POP was applied, including the pins as explained. Once the cast was set, it acted as a framework like that of an external fixator, with transfixion pins to maintain fracture alignment. This procedure was usually done under short general or spinal anaesthesia. The knee ROM was started from day 1 and oral antibiotics were placed for the patient for 5 days. The patients were followed up at one, three and six weeks, three and six months and one year following hospital discharge. Regular X-ray assessment was done within the 1st week of surgery, then at 6th week and then after one year. Once the fracture showed callus formation (approximately 6 weeks), we removed the cast and pins and applied a new cast and began progressive weight-bearing.

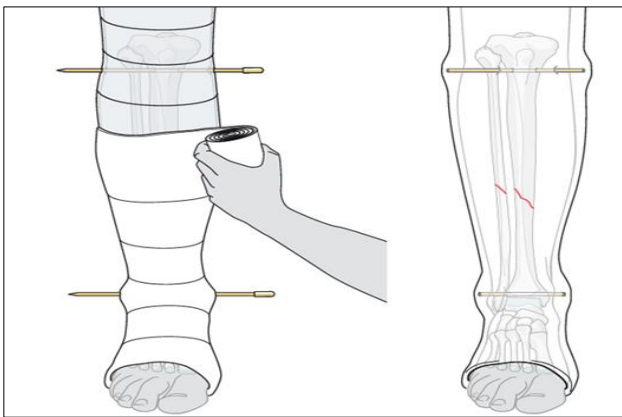


Figure 5: Cast application image.

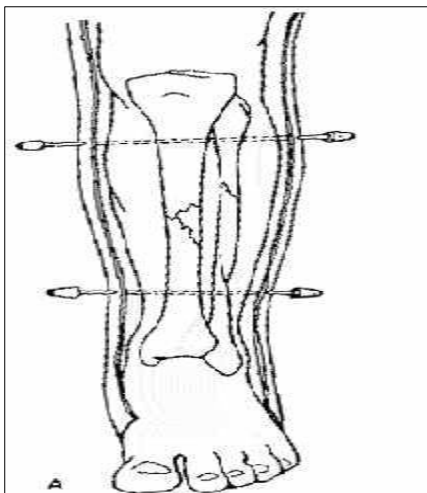


Figure 6: Diagrammatic illustration of the fixation with exfix or two pins.

There were only 3 cases of pin tract infection, which were treated successfully with an empiric oral antibiotic and earlier removal of the pin and plaster was not necessary. All the patients started partial weight-bearing after 2 months. By the end of 1 year, all of them resolved and were walking with full weight-bearing. Two people had to get

surgery for the fibular fixation due to fracture extension to the syndesmosis.



Figure 7: Postoperative X-ray showing pin casting with the fixation of the fibula and transfixion pins to stabilizing the fracture with k wires.



Figure 8: Post-operative follow up of the case after 2 months where the pins and k wire removal were done in the same case as of the previous figure.



Figure 9: X-ray showing proper casting technique in a distal 1/3rd fracture of the tibia.

DISCUSSION

Several operative techniques were accessible for achieving good and stable articular support for fractures.⁶ One such technique was closed percutaneous pinning with cast immobilization. This percutaneous pinning provides good stability with the addition of sufficient support with closed

reduction and cast immobilization.¹⁰ Several studies reported the results of traditional manipulation and casting in contrast with other treatment modalities. Only casting isolated was not enough to maintain reduction, and may lead to poor functional and cosmetic outcomes.¹¹ However, in his study, Azzopardi showed that only percutaneous pinning alone did not offer good clinical outcomes like only cast immobilization. In our study, we used Kirschner (K-) wires to fix the fracture in some cases.¹²

The main limitation of our study was a loss of follow-up over time, which may put at risk the legitimacy of both the radiological and functional outcome assumptions. There was very little literature for this method for distal tibia.

CONCLUSION

Our study supports pin-in-plaster fixation as an excellent technique for the treatment of fractures of the distal 1/3rd tibia. This procedure is less invasive and easier than other interventions, and effectively re-establishes anatomic congruity and maintain reduction.

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Ethical approval: Not required

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