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Technical Note

# A novel technique for accurate Poller (blocking) screw placement

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ABSTRACT

Achieving good results with intramedullary nailing of oblique long bone fractures at the metaphyseal–diaphyseal junction can be difficult. There is a strong tendency for axial displacement and an association with characteristic malalignment of the short fragment. Poller or blocking screws have been shown to be effective in aiding fracture reduction. While several papers describe methods for screw placement, these are confusing to understand, difficult to follow in clinical practice and not always applicable. Here we describe a new, simple, reproducible and easy to use method for ensuring accurate Poller screw placement, in order to maximise the benefits of their use and achieve good overall results.



## Introduction

Poller (blocking) screws first described by Krettek et al. [1] are an important adjunct for intramedullary nailing and have been shown to be effective in aiding fracture reduction [2–5]. They help direct the nail during insertion [5], control angular deformity [2] and increase the stability of the bone-implant construct [1,5].

The most frequent indication for the use of Poller screws is in oblique long bone fractures at the metaphyseal–diaphyseal junction, where intramedullary nailing is associated with characteristic malalignment of the short fragment and has a strong tendency for axial displacement due to size discrepancies between the diameters of the medullary canal and the intramedullary nail [6].

By narrowing the medullary canal in the metaphyseal or flared segment of the bone by the placement of a Poller screw, this size discrepancy can be overcome to provide a tight mechanical fit for the nail [1,5,6].

Accurate placement also enables 3-point fixation principles which help to overcome the muscular and ligamentous displacement forces responsible for the associated axial displacement [5,6]. The screw supplies the third point, with the other two being the isthmus of the long bone and either the anchorage point at the tip of the nail or the entry point [5].

The accurate placement of Poller screws is therefore essential in order to achieve the maximum benefit of their use, and requires good preoperative planning. However, most articles describe placing the screws in the concave side of the short fragment, ensuring to avoid the convex side [2,5,6]. Others describe placing them where 'you don't want the nail to go'. This can be confusing in clinical practice and is not always applicable. In this article we describe a new, simple, reproducible and easy to use method for ensuring accurate Poller screw placement, in order to maximise the benefits of their use and achieve good overall results.

## Method

Using Picture Archiving and Communication Systems (PACS) software or similar. Start by drawing a line down the long axis of the displaced, flared segment of bone. Then draw a second line along the plane of the fracture, ensuring to bisect the first line. Due to nearly all metaphyseal fractures having a degree of obliquity, this should create 4 angles; 2 acute and 2 obtuse.

For correct reduction the screws need to be placed in the acute angles. By placing a screw in the flared or widest segment where it will have maximal effect in overcoming any size discrepancy between the implant and the metaphyseal diameter, it may be possible to use just one screw and this should be the preferred site of placement for the first screw. When the nail comes into contact with the screw the course of the nail should then be deflected so that the displaced segment becomes reduced in the desired direction, due to the tight mechanical fit provided by the narrowed metaphyseal diameter.

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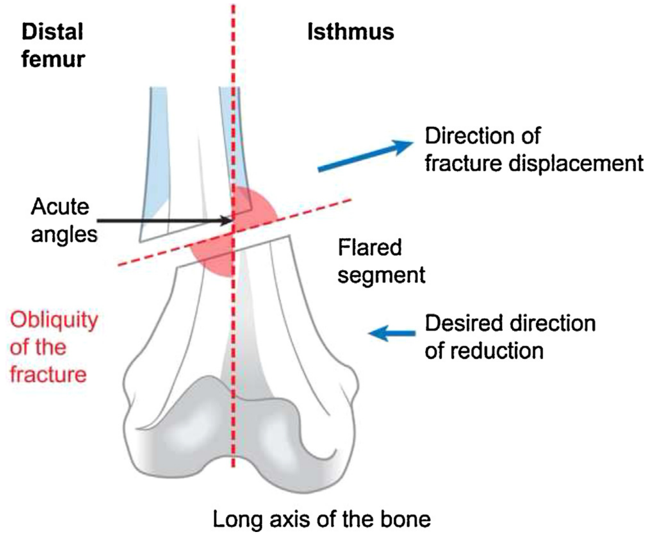


**Fig. 1.** This illustration of an oblique fracture of the distal femur demonstrates how to identify the acute angles and shows the desired direction of reduction required to overcome the displacing forces and achieve accurate reduction.

If a second screw is necessary this should be placed in the other acute angle which will be nearer to the isthmus and therefore have less of an effect but will potentiate the effect of the first screw. It may also be necessary to apply screws using this technique in more than one plane in more complex fractures.

## Step by step

(1) Draw a line down the long axis of the displaced, flared segment of bone.
(2) Draw a second line along the plane of the fracture, ensuring to bisect the first line.
(3) Identify your acute angles (Figs. 1 and 2).
(4) Place your screw in the acute angle of the metaphyseal or flared segment.
(5) Insert your guide wire under fluoroscopy guidance, ensuring the tip passes the correct side to ensure reduction.
(6) Insert your nail, which should be deflected on engaging the screw providing reduction and compression at the fracture site (Figs. 3 and 4).

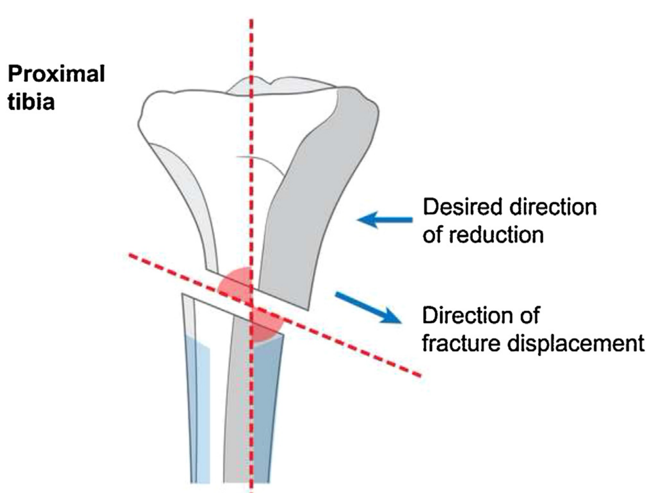


**Fig. 2.** An illustration of an oblique fracture of the proximal tibia, with a reverse obliquity to the one demonstrated in the distal femur.

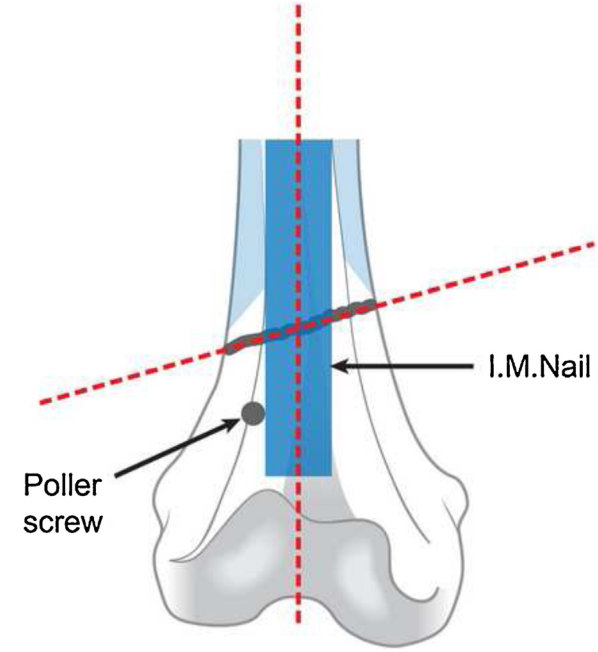


**Fig. 3.** The intramedullary nail engaging the Poller screw which was placed in the acute angle of the flared segment (distal segment in this example), accurately reducing the distal femoral fracture.

(7) If reduction could be improved further by the addition of a further screw, this should be placed in the acute angle nearer to the isthmus.

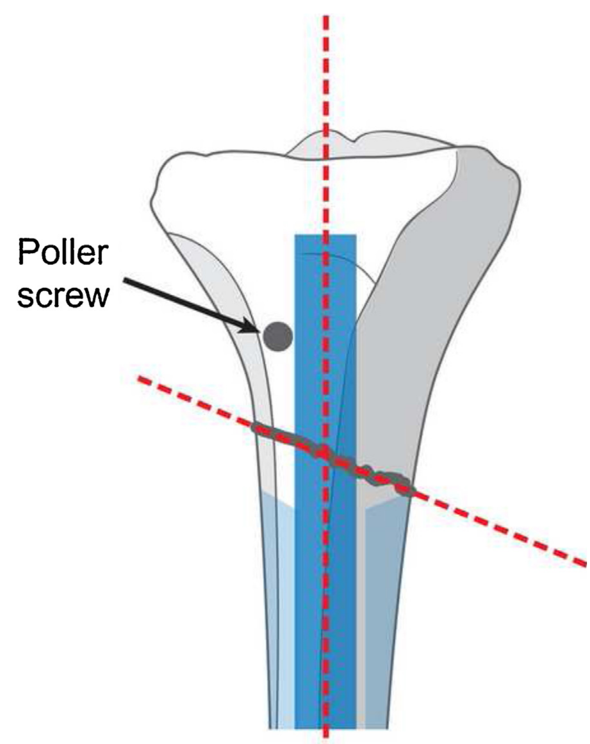


**Fig. 4.** The intramedullary nail engaging the Poller screw which was placed in the acute angle of the flared segment (proximal segment this time), accurately reducing the proximal tibial fracture.