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RESEARCH ARTICLE

A NOVEL AND REPRODUCIBLE TECHNIQUE OF DISTAL LOCKING IN INTRAMEDULLARY NAILING OF LONG BONES 'THE PUSH WITH HAND TECHNIQUE'

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ABSTRACT

Interlocked nailing as a treatment modality for long bone fractures is one of the most widely performed orthopedic trauma surgeries. Closed locked nailing is the gold standard method of treating the long fractures. One of the most difficult steps in this surgery is distal locking of screws. Various techniques have been described for distal locking, but sometimes they become unsuccessful, time consuming and involve excessive radiation exposure. Also they involve various specialized equipments which increase the surgical time and cost. We present a simple, safe, cost effective and highly reproducible technique for distal locking which involves pushing the drill bit into the locking holes with hand.

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INTRODUCTION

Fractures of the shaft of long bones are amongst the most common fractures encountered in orthopedic trauma practice. Closed locked nailing is well accepted treatment for fixation of these fractures. At the same time closed nailing especially the distal locking is a technically demanding procedure; exposing the patient and surgeon to radiation. Numerous techniques and devices have been proposed to aid distal locking in attempts to overcome some of the associated problems. However distal locking still remains one of the most difficult part of the surgical procedure in intra-medullary nailing (Berlusconi *et al.,* 2011). The already described techniques of distal locking are free hand technique, use of aiming/targeting devices, use of jigs, nail over nail technique (Rohilla *et al.,* 2009), use of k-wires (Kundsen *et al.,* 1991), computer assisted navigation etc. The accuracy of aiming/ targeting devices and jigs remains doubtful as there is deformation of femoral nail after insertion as reported by various authors (Krettek *et al.,* 1998). The traditional free hand technique uses the awl (Canale and Beaty, 2008) or translucent targeting device with attached Steinmann's pin or K-wire which has to be hammered to make the pilot hole. After the pilot hole is made, the drill bit is used to drill further.

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This technique often causes the hole to be lost thereby causing unnecessary radiation exposures and increase in operative time. Splintering of the bone by direct hammer technique may also occur. We in this study present a simple, novel and highly reproducible technique of distal locking which uses directly drill bit assembly to drill the proximal and distal cortices. The drill bit is advanced in the hole of nail manually using drill bit in hand technique. This technique requires no aiming or targeting device and no assistant. The only equipment needed is a drill bit assembly with power driver.

Technique

The intera-medullary interlocking nail is inserted using the standard technique for nail insertion (Canale and Beaty, 2008) and the proximal locking is done through jig. The image intensifier is then positioned to display the strict lateral image of the distal end of the nail. The position of the C-arm of the image intensifier is then adjusted until the two distal locking holes of the nail are seen as perfect circles (Fig 1). A stab incision is sited directly over one of the two distal screws. Using a small artery forceps bone is reached by blunt dissection. The periosteum is then stripped by rubbing artery forceps both in longitudinal and vertical directions, so that the drill bit does not slip over the periosteum. Then the drill is loaded on a power driver (electrical/pneumatic) and the tip of the drill bit is placed in direct contact with the surface of the bone at an angle of 60 degrees (approximately) and is adjusted until the tip of the bit is located exactly in the centre of the locking hole.

Fig. 1. Strict lateral view showing distal locking holes as perfect circle

This angle is to facilitate imaging. Ideally one should see the radio-lucency all around the tipoff the drill bit (Fig. 2). Now keeping the tip of drill bit firmly pressed against the bone, the handle of the driver and drill bit are brought exactly perpendicular to the long axis of the bone and parallel to the C-arm of the image intensifier. Ensure the tip off the drill bit does not slip; otherwise the steps have to be repeated even if there is a minor slip of the drill bit tip. With sustained firm pressure only the near cortex of the bone is drilled and then the drill bit is detached from the power driver.

Fig. 2. Note the ideal position of drill bit before drilling first cortex

An image is now taken to determine the position of the bit (Fig. 3). If the drill bit is in the centre of the hole then surgeon pushes the bit further into the locking hole of the nail by hand only (Fig. 4). If there is a feeling of give away and no resistance is felt, then the drill bit is pushed manually till far cortex. If there is some resistance felt or there is metallic sound, then the direction of the push is adjusted till there is feeling of give away. An image is taken to confirm the position of the bit.

Fig. 3. Correct position of the drill bit after penetration of first cortex

Fig. 4. Drill bit is pushed in the desired direction with hand

Fig. 5. Here after drilling the proximal cortex, the drill bit is found to be incorrectly placed and hence direction of bit is adjusted with the hand so that there is felling of give away, which is subsequently checked on image (Fig 6) as below

Fig. 6.

Fig. 7. Both o the distal holes locked

However if the drill bit is not in the centre (Fig. 5) of hole on image intensifier picture then adjust the drill bit by slightly withdrawing it with hand only (but keeping the bit into the near cortex) and then pushing the drill bit by hand in the required direction (anterior, posterior, proximal or distal) till far cortex is reached. Image is taken again to confirm the position, which invariably will be correct after this manure. The drill bit is reattached to the power driver and far cortex is drilled (Fig. 6). The drill bit is then removed and depth gauge is used to measure the length of the screw. The screw of the appropriate diameter and length is then inserted into the drilled hole. The procedure is then repeated for the other distal screw hole as well. Final antero-posterior (AP) view and lateral views are then taken to confirm the length and position of the screws.

DISCUSSION

Locking an intramedullary nail makes the construct more stable and stops rotation of the nail within the bone and also stops rotation of the two fragments. The proximal locking is usually done with a jig but nail deformation during intramedullary insertion makes using a jig inaccurate for the distal screws[4]. Most nail systems require a freehand technique for the distal locking which can at times take 50% of the total screening time (Sugarman *et al.,* 1988). Other methods of aiding distal locking have been described in the literature include proximally mounted targeting device (Kretteck *et al.,* 1999) or laser devices (Goodall, 1991), use of k-wires (Kundsen *et al.,* 1991), nail over nail technique (Rohilla *et al.,* 2009), making a cortical window on the lateral surface of femur (Kanellopoulos *et al.,* 2003), use of cannulated drill bits over K-wires, the 45 degree technique[1] etc. In the free hand technique awl is use to make the pilot hole, and then the awl is replaced with drill bit to make the definitive hole (Canale and Beaty, 2008). Various technical problems are faced with the above mentioned techniques. In the conventional free hand technique a radiolucent device is also used. An awl or Steinman's pin is used along with targeting device, to make the initial hole and subsequently definitive hole is made by drill bit. This process increases the operative time and number of exposures. Multiple holes can be formed by this method making the locking more difficult. Hammering of all can shatter the proximal cortex and cause screw loosening. Nail over nail technique stresses on the over-reaming of medullary canal or putting a smaller size nail to prevent nail deformation. But putting a loose nail in the canal is not advisable. Also making a cortical window as suggested by some authors[10] to lock the distal screws is not justifiable. We have used this method to lock more than 100 interlocking nails in femur and tibia and have successfully placed the screws in almost all of the patients. There have been no complications so far.

Our technique is simple, easy to learn and highly reproducible. No assistant or any special instrument is required. Only drill bit assembly with power driver is required. In our technique the near femoral cortex is drilled, the drill bit is detached from the power driver and then the drill bit is pushed in the locking hole with hand. This offers many advantages like, by pushing the drill bit with hand there are no chances of damage to the nail or breakage of the drill bit, which can occur when high speed rotating drill strikes the nail during the procedure. Secondly minor adjustments in the direction of the drill bit can be easily made if our pilot hole is slightly incongruous in relation to the locking hole of the nail. Thirdly the surgeon after pushing the drill bit in the locking hole stands away from the direct beam of image intensifier there by reducing the radiation exposure on him or her. Fourth, no additional equipment is required and moreover no assistant is required. Our experience has shown that this technique allows quick and accurate distal locking with minimal time taken for screening. In the hands of the senior author (AG), the average time taken to distally lock the two screws (from start of screening to insertion of second screw) was 12 minutes (range 8-20 mins) in femur and 9 minutes (range 6-15 mins) in tibia.

Conclusion

Hence, we conclude that this technique is a novel, safe (no damage to nail, drill bit and bone) and less radiation exposures), cost effective (no extra equipment needed), simple and highly reproducible technique to lock distal screws in interlocking nailing.

REFERENCES

Berlusconi, M., Chiodini, F. and Filippi, L. 2011. The "45 degree" distal locking technique: a new time and radiation saving saving free hand technique for distal locking in intramedullary nailing. *Journal of Orthopedics*, 3:9-15.

Canale, S.T. and Beaty, J. H. 2008. Campbell's operative orthopedics. Vol 3, 11th edition. *Mosby Elsevier*, 3199-203.

Goodall, J. D.1991. An image intensifier laser guidance system for the distal locking of an intramedullary nail. Injury, 22:339.

Kanellopoulos, A. D., Yiannakopoulos, C. K., Vossinakis, I., Badras, L. S. 2003. Distal locking of femoral nails under direct vision through a cortical window. *J Orthop Trauma,* Sep; 17(8):574-7.

Kretteck, C., Konemann, B., Miclau, T., Kolbli, R., Machreich, T., Tcherne, H. A.1999. mechanical distal aiming device for distal locking in femoral nails. *Clin Orthop.*, 364:267-75.

Krettek, C., Mannss, J., Miclau, T., Schandelmaier, P., Linnemann, I., Tscherne, H. 1998. Deformation of femoral nails with intramedullary insertion. *J Orthop Res*, Sep; 16(5):572-5.

Kundsen, C. J .M., Grobler, G.P., Close, R.E.W. 1991. Inserting the distal screws in locked femoral nail. *J Bone Joint Surg [Br]*, 73-B: 660-1

Pennig, D., Brug, E., Kronholz, H. L.1988. A new distal aiming device for locking nail fixation. *Int. Orthopaedics*, 11:1725-7.

Rohilla, R., Singh, R., Magu, N., Devgun, A., Siwach, R., Gulia, A. 2009. Nail over nail technique for diatal locking of femoral intramedullary nails. *International Orthopedics,* Aug; 33(4):1107-12.

Sugarman, I. D., Adam, I., Bunker, T. D. 1988. Radiation dosage during AO locking femoral nailing. *Injury*, 19:336-8.

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