

**Technical Report****Trochanteric entry awl for cephalomedullary nailing of femur****Shashikant B Ganjale^{1*}**¹Dept. of Orthopaedics, Ashwini Sahakari Rugnalaya and Medical Research Centre, Solapur, Maharashtra, India**ARTICLE INFO***Article history:*

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ABSTRACT

Proximal femur fracture fixation with cephalomedullary nails are done routinely nowadays. It needs a precise entry site for passing nail after proper near anatomical reduction. More over comminution of fracture obesity add up more difficulty for fixation. Awls are used to make a entry in proximal femur in trochanteric pyriformis fossa. The available awls provided by different implant companies vary in size and shape and length, this causes difficulty in having a proper entry especially in obese patients wherein the pendulous abdomen wall and flanks obstruct the awl handle. So the author has designed solid as well as cannulated Trochanteric entry awl for ease of making entry in proximal femur thus making the surgery easy.

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Awl is a tool used by shoemakers, carpenters and other craftsmen who need to punch small holes through leather or wood. Orthopaedics is also a craftsmanship where in Awl is important tool used for making a hole in bone for proper placement of implant.

Awl is an instrument commonly used to make entry in the bone in interlocking nailing of long bones Closed TENS Enders nailing Tibia and Humerus interlocking nailing. Any other similar sharp instrument like solid K nail reamer of appropriate diameter size can be used to make entry.

An awl is designed taking into consideration of entry path in various bones especially focusing on proximal femur nailing.

2. Discussion

The crux of Cephalomedullary nailing like Trochanteric Fixation Nail (TFN), Proximal Femur Nail (PFN), Hip

Fixation Nail (HFN), Gamma Nail, Intertan, ZNN in intertrochanteric fractures is proper anatomic reduction and precise entry for nail. In noncomminuted fractures it is easy to have an entry just medial to tip of greater trochanter or pyriformis fossa especially in thin and lean patient. Routine available awls pose some difficulty for entry, and it is more difficult in obese patients wherein these available awls fall short of length and curvature of these awls to reach trochanter, and does not allow proper path and entry because of obesity. The author has designed a Trochanteric entry awl which is very much useful for cephalomedullary nailing of proximal femur fractures.

In comminuted unstable fractures the fracture is screened under C arm in AP and Lateral views first and judged in which position it gets best reduced. A percutaneous transfixation with 3 mm k wire is needed to maintain reduction. It is passed just anteriorly from Greater trochanter into neck and head checking that it does not come in the way of nail. Ideally AO mentions entry should be done with guide pin with proper placement in trochanter checking under c arm in AP and Lateral views and enlarge the hole by

* Corresponding author.

E-mail address: sbganjale_live@rediffmail.com (S. B. Ganjale).

passing a cannulated instrument over guide pin.

Entry becomes difficult in comminuted unstable intertrochanteric fractures, more so in obese patients the sagging abdomen pendulous belly bulky thighs obstructs the awl to reach the proper site of entry over the trochanter.

There are different types of awl with different shapes and sizes and length and thickness. Some are short some are long and curved some are straight. All these shapes and lengths of awl cannot enter up to proximal femur metaphysis. Multiple entries with such awls causes more comminution, false entry passages, comminution of lateral wall converting stable fracture into unstable fracture.

2.1. Different types of awls and their shapes

Different implant companies have come up with different types and shapes of awls, but anticipating the difficulties associated with them in having a good entry, the author has designed a trochanteric awl taking into consideration of patient profile like obese patients comminution of proximal femur and the ease of passing guide wire into proximal femur.

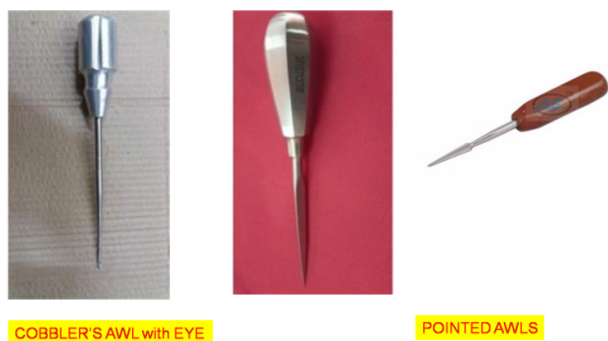


Figure 1: Cobblers awl with eye and pointed awls useful for smaller bones nailing such as radius ulna nailing

2.2. Difficulty with standard awl

Imagine how difficult it is of taking entry in such obese patients with pendulous abdomen bulky thigh.

2.3. Clinical intra operative C arm images representation

2.4. Ideal trochanteric entry awl

It should be long enough to reach and open up medullary canal in proximal metaphysis of femur.

It should have Tapering gentle curve.

Sharp pointed tip with gradual widening.

The handle and tip of awl should not be in one straight line.

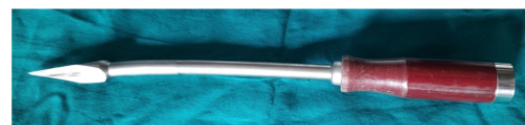


Figure 2: Various awls curved awl with round handle and standard awls with short length tips which cannot open up canal



Figure 3: Obese patient on fracture table



Figure 4: Awls with its shapes and directions of sharp pointed tips and direction of handle and its curves



This has very mild curve No offset No offset compared to this regular awl

Figure 5: A cannulated awl with very mild curve difficult to pass in obese patient

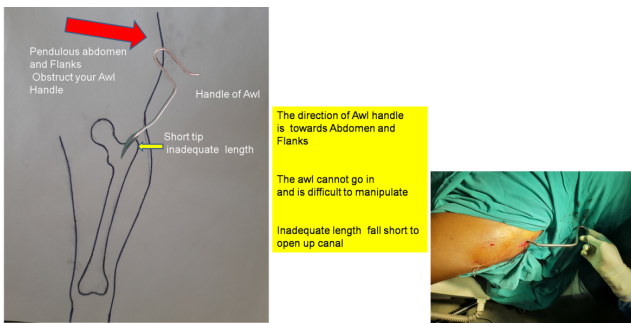


Figure 6: A picture showing How difficult it is to have an entry with this type of awl which is short cannot reach medial to Greater trochanter and the curved handle facing towards flanks and pendulous abdomen which resists the awl getting in inspite of full adduction. The handle is pushed laterally and the tip of awl entry goes in medial direction which is wrong

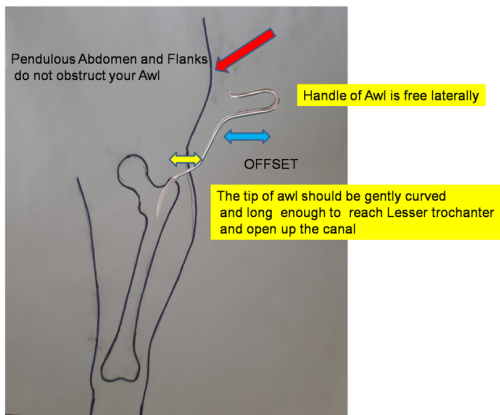


Figure 7: Showing how a awl having good offset and long gentle curved awl can have a good entry in Trochanteric fossa. Very useful in obese patients and bulky thigh. This Awl is designed by Dr. Shashikant B. Ganjale



Figure 8: Awl with good offset but is short and handle being directed on inner side is obstructed by obese pendulous abdomen

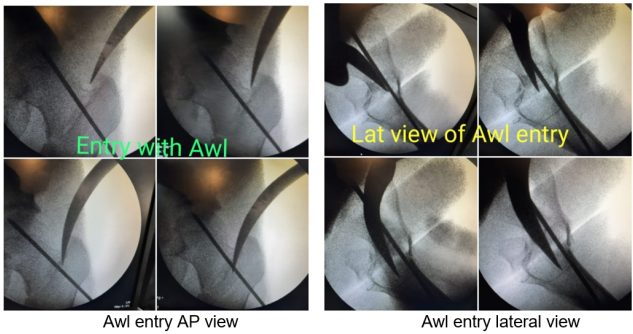


Figure 9: Example 1: A Intertrochanteric fracture stabilized with percutaneous Thick K wire and entry is made

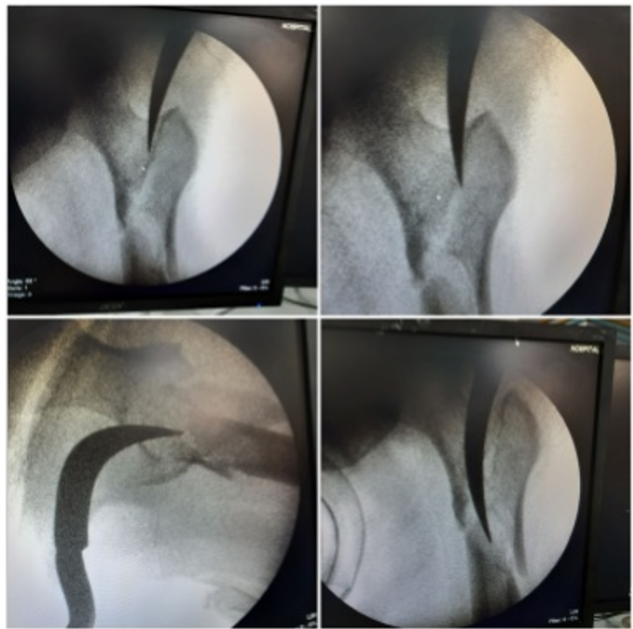


Figure 10: Example 2: Dr Shashikant B. Ganjale’s solid trochanteric entry awl entry is easy

There should be adequate double offset (gentle curve of handle and shaft of awl) to accommodate the thickness of soft tissue at proximal thigh trochanteric region and protruding abdomen.

It has U curved handle should be on lateral side with its tip indicating the tip of awl.

2.5. Cannulated Awl

Various cannulated awls are depicted in pictures below along with their disadvantages.

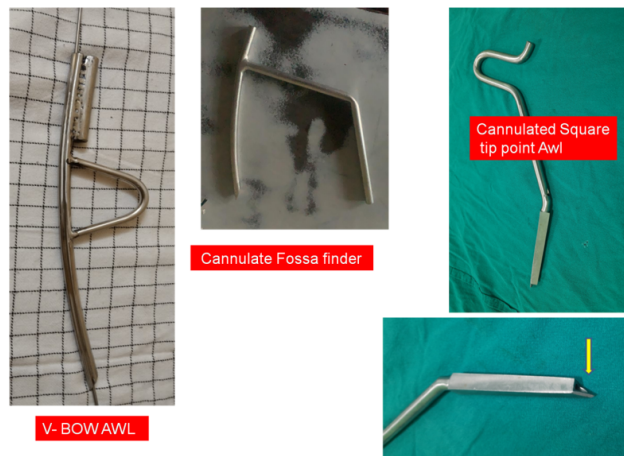


Figure 11: Cannulated Awls or also called as Fossa finders

The above cannulated awls or so called fossa finders are used to locate the entry hole made and negotiated into hole and then guide wire is passed through these cannulated instruments.

In comminuted intertrochanteric fractures making an entry is crux of surgery with no repetition of steps, and in doing so will add to displacement of fragments with manipulations or creating false passage.



Figure 12:

2.6. Disadvantages of cannulated awls of above shown pictures

They are short,



Figure 13: This awl is cannulated but is short. The exit hole at the tip of awl is on convexity aspect. So when guide wire is passed it tends to go medially and can injure vital neuro vascular structures. The handle of awl and tip are in straight line there is no offset

They have handle and tip directed in one plane so passing of guide wire is difficult once awl is entered in.

The handle is facing medially toward abdomen while making an entry and is difficult in obese pendulous patients.

There is no offset clearance.

The exit hole at the tip of awl is on convexity aspect. So when guide wire is passed it tends to go medially and can injure vital neuro vascular structures. Especially in comminuted proximal femur fractures.(Fig 12)

Dr Shashikant B Ganjale's Cannulated Trochanteric entry awl is designed taking into considerations of difficulties anticipated by many orthopaedic surgeon colleagues while performing TFN PFN PFNa1 and PFNA2 HFN Gamma Nails, and also HFN Hip Fixation Nail Or IMHS Intra Medullary Hip Screw.

2.7. Specifications of Dr Shashikant Ganjale's cannulated awl

Dimensions

This Awl is cannulated and is long. The exit hole at the tip of awl is on concavity aspect. So when guide wire is passed it tends to go laterally and parallel to lateral cortex. The handle of awl and tip has good offset.

This awl can be used for TFN, PFN, standard antegrade Femur interlocking nailing, IMSC (Distal femur Nail) and Tibia IL nailing and especially useful in Proximal Tibia IL nailing.

Many a times after making proper entry with solid awl, we face difficulty in finding the entry hole and passing guide wire through the entry hole. Now the awl is designed to be cannulated, this avoids multiple piercing, multiple entry, by removal and re insertion of awl and creating false passages during making an entry. The advantage of cannulated awl is once you have made a proper entry with awl opening the medullary canal a guide wire is passed through the cannulation of awl directly into medullary canal without missing the entry hole. Once guide wire is negotiated in

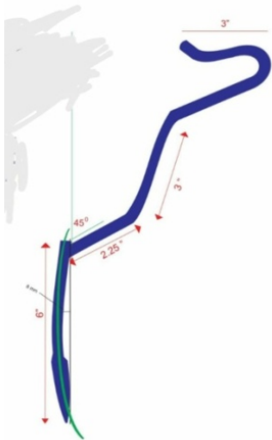


Figure 14: Cannulated trochanteric awl



This Awl is cannulated and is Long.
The exit hole at the tip
of awl is on concavity aspect.
So when guide wire is
passed it tends to go parallel to lateral cortex



Figure 15:

medullary canal through cannulated awl, the awl can be removed and further procedures like enlarging the entry hole, reaming and passing a nail can be carried out easily.

2.8. Advantages of cannulated awl designed by Dr Shashikant B Ganjale Solapur

Awl tip is sharp, gently curved and long enough to have good entry in trochanteric fossa upto lesser trochanter.

Awl has double offset useful in obese patients.

Can be used as joystick to lever the segment to align and reduce with distal segment for passing guide wire.

The Handle of the awl is facing laterally making handling and manipulation easy.

The exit hole of cannulated tip is on lateral side (concavity of awl tip) so that the guide wire tends to go parallel to lateral cortex of femur.

Similarly, the exit hole can be changed by rotating handle making it face anteriorly in distal femur nailing so that the guide wire moves parallel to lateral cortex of femur in femur nailing and anterior cortex of tibia in tibia nailing.



Figure 17: Using Dr. Ganjale's cannulated awl ease of having entry in proximal femur

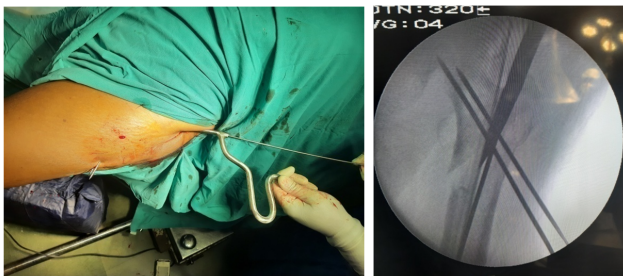


Figure 16: Clinical and C arm picture of cannulated awl and passing guide wire

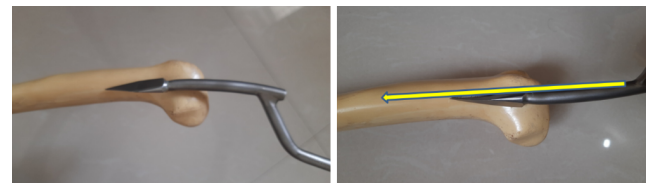


Figure 18: Using Dr. Ganjale's cannulated awl ease of having entry in distal femur for retrograde nailing. the tip can be rotated anteriorly or posteriorly, medially or laterally to negotiate guide wire into proximal segment



Figure 19: Cannulated awl used for making entry in Tibia InterLocking nailing



Figure 21: This is a recent modification with simple wooden handle with double offset for ease of handling avoiding metallic U handle does not come in the way while viewing in lateral view under c arm



Figure 20: Dr Shashikant B Ganjale's solid and cannulated trochanteric entry Awl

3. Conclusion

The solid and cannulated awls newly designed by Dr Shashikant B Ganjale Solapur has advantages over routine awls with ease of handling and surgeon friendly helping to have good entry in intramedullary nailing of long bones especially in hip fixation with cephalomedullary nails in obese and normal patients. The same is useful in Tibia nailing and Distal femur nailing too.

I faced many difficulties using different types of awls of different implant companies, this inspired me to take efforts for designing this awl.

Hope it will be very useful to all orthopaedic colleagues and freshers doing cephalomedullary nailing in proximal and distal femur fractures along with tibia interlocking nailing.

4. Acknowledgement

Thank all my orthopaedic colleagues who have used and are using this awl.

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Author biography

Shashikant B Ganjale, Consultant Orthopaedic Surgeon