

Venting in Closed Femoral Nailing: A Simple Technique Using a Frazier Suction Tip

Theerawoot Tharmviboonsri, M.D., Kongkhet Riansuwan, M.D., Rapin Phimolsarnti, M.D., Banchong Mahaisavariya, M.D.

Department of Orthopaedic Surgery and Rehabilitation, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand.

ABSTRACT

A surgical technique to drain the medullary content during closed femoral nailing by using a Frazier suction tip as a vent is demonstrated. This method is simple, safe and reproducible. The medullary content can be drained outside without surrounding soft tissue contamination and the intramedullary pressure is possibly minimized when femoral canal reaming and nail insertion is performed.

Keywords: Vent, femoral nailing, intramedullary pressure, fat embolism

Siriraj Med J 2011;63:92-93

E-journal: <http://www.sirirajmedj.com>

Increasing intramedullary pressure has been recognized as one of the risk factors causing embolic events and pulmonary complications after closed femoral nailing in multiple fractures, pulmonary trauma and, of course, pathologic fractures.^{1,2} Intravasation of the medullary content including physiologic response to intramedullary reaming may be a cause of small vessel occlusion especially in the pulmonary vasculature.³ Attempts have been reported in order to minimize such potential risks in two ways. One of these is to release the intramedullary pressure by making a hole at the lateral cortex of the distal femoral canal.⁴⁻⁷ However, leakage of the medullary content might contaminate the surrounding soft tissue especially when femoral metastasis is encountered. Another method is applying a special reamer with irrigation and suction equipment that can remove the medullary content and reduce the possibility of fat intravasation.^{3,8} Nevertheless, this special instrument is not available in our situation. We, therefore, introduce a simple technique to drain the medullary content outside in order to reduce contamination and release the pressure during closed femoral nailing.

Surgical technique

Prior to femoral canal perforation by the standard procedure of closed nailing, a drill hole is percutaneously created at the lateral cortex of the distal femur by using a

Steimann pin which has a diameter which corresponds to a Frazier suction tip, usually 4.0 mm, using c-arm image intensifier guidance (Fig 1A). The drill hole should be localized at the area that can be finally covered by the nail and distal locking screw. The pin is then replaced with a Frazier suction tip in order to function as a vent. Attention should be taken not to place the suction tip too deep into the medullary canal, otherwise, it might obstruct the reaming instrument (Fig 1B). The medullary content can be initially aspirated prior to reaming (Fig 2) and continuously drained outside throughout the process of closed nailing which is usually 50-70 ml (Fig 3).

DISCUSSION

Pulmonary embolism remains a serious complication associated with closed intramedullary fixation of the femur especially in multiple fractures, lung injury and metastasis. Higher risk may be presented when closed nailing is carried out in a long closed space such as impending pathologic fractures and proximal femoral fractures. Making a drill hole as a vent at the distal femoral canal can drain the medullary content and release the intramedullary pressure during closed nailing. However, contamination of the surrounding soft tissue should be avoided especially in femoral metastasis.

This report demonstrates a modified technique using a Frazier suction tip to function as a vent at the distal femoral canal. The amount of medullary content can be initially reduced by aspiration via the suction tip prior to femoral canal perforation by the Awl reamer. The remain-

Correspondence to: Kongkhet Riansuwan

E-mail: sikrs@mahidol.ac.th

Received: 27 October 2010

Revised: 28 February 2011



1A.

1B.

Fig 1. A drill hole was created at the lateral cortex of the distal femur using a 4.0 mm Steinmann pin (Fig 1A) and then replaced with a Frazier suction tip (Fig 1B).

ing content can sequentially be drained outside without contamination during the process of reaming. By applying these techniques, the possibility of marrow intravasation and fat embolism caused by femoral nailing should be minimized.

In our practice, this technique has been applied since 2008 in the cases of high risk for fat embolism, pathologic and impending pathologic fractures of the femur. All patients, comprising at least 10 patients, did not have significantly clinical symptoms and signs of pulmonary embolism. No fracture occurred at the location of the venting hole. However, intramedullary pressure could not be measured intraoperatively in our situation.



Fig 2. The medullary content can be aspirated prior to femoral canal reaming.



Fig 3. The remaining medullary content can be continuously drained via a Frazier suction tip throughout the process of closed nailing.

This article has reported the surgical technique of using a Frazier suction tip to drain the medullary content and pressure during femoral canal reaming and nail insertion in the case of high risk for fat embolism. A Frazier suction tip is a basic instrument that can be found in almost all of the hospitals in Thailand, and the size of this instrument is appropriate for such a purpose. Moreover, it is inexpensive and more available compared to the specific irrigation and suction reamer.

REFERENCES

1. Christie J, Robinson CM, Pell AC, McBirnie J, Burnett R. Transcardial echocardiography during invasive intramedullary procedures. *J Bone Joint Surg Br.* 1995;77:450-5.
2. Pell AC, Christie J, Keating JF, Sutherland JR. The detection of fat embolism by transesophageal echocardiography during reamed intramedullary nailing: a study of 24 patients with femoral and tibial fractures. *J Bone Joint Surg Br.* 1993;75:921-5.
3. Husebye EE, Lyberg T, Madsen JE, Eriksen M, Roise O. The influence of a one-step reamer-irrigator-aspirator technique on the intramedullary pressure in the pig femur. *Injury.* 2006 Oct;37(10):935-40.
4. Jones RH. Physiologic emboli changes observed during total hip replacement arthroplasty. A clinical prospective study. *Clin Orthop.* 1975;112:192-200.
5. Martin R, Leighton RK, Petrie D, et al. Effect of proximal and distal venting during intramedullary nailing. *Clin Orthop.* 1996;332:80-9.
6. Sturmer KM. Measurement of intramedullary pressure in an animal experiment and propositions to reduce the pressure increase. *Injury.* 1993;24 Suppl:S7-21.
7. Ulrich C. Value of venting drilling for reduction of bone marrow spilling in cemented hip endoprosthesis. *Orthopedics.* 1995;24:138-43.
8. Pape HC, Zelle BA, Hildebrand F, Giannoudis PV, Krettek C, van Griensven M. Reamed femoral nailing in sheep: does irrigation and aspiration of intramedullary contents alter the systemic response? *J Bone Joint Surg Am.* 2005 Nov;87(11):2515-22.