저자들은 경골 간부의 단순 골절의 페쇄성 골수강내 금속정 삽입술 후 발생한 전경골동맥의 가성동맥류 한 예를 보고하고자 한다. 56세 남자로 교통사고에 의한 좌측 경골 골간부위에 단순 횡골절을 주소로 내원하였다. 수술적 치료로서 페쇄성 골수강내 금속정 삽입술 및 외측에서의 근위부 및 원위부 잠금 나사못 고정을 시행하였다. 수술 후 10일경 원위부 잠금 나사못 삽입부위에 맥박이 촉지되고 크기가 증가하는 연성 종물이 발견되었으며 초음파 검사 및 혈관촬영술 후 전경골 동맥 원위부에 발생한 가성동맥류로 진단되었다. 수술 소견상 가성동맥류 제거후 원위부 잠금 나사못 삽입부위의 근접 후방에 위치한 전경골 동맥에 작은 종열상이 발견되었으며 손상부위의 분절절제 및 족부 피하 정맥이식을 시행하였다.

색인 단어 : 경골 골절, 골수강내 금속정 삽입, 가성 동맥류

Pseudoaneurysm of the Anterior Tibial Artery After Closed Intramedullary Nailing of a Tibial Shaft Fracture
- A Case Report -
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We would like to present a case of pseudoaneurysm of the anterior tibial artery after closed intramedullary nailing of a tibial shaft fracture. In an automobile accident, a 56-year-old man sustained a transverse diaphyseal fracture of the left tibia. 10 days after closed intramedullary nailing with laterally inserted proximal and distal locking screws, an enlarging tender, pulsating mass was found over the anterolateral aspect of his left leg. Ultrasonography and angiography revealed a pseudoaneurysm of the anterior tibial artery at the level of the distal locking screw. Surgical resection of the injured segment of the anterior tibial artery associated with a pseudoaneurysm and a vein graft was performed.

Key Words : Tibia fracture, Intramedullary nailing, Pseudoaneurysm

The ruptured vessel, which may be associated with a fracture or its management, would develop a pseudoaneurysm. Arterial pseudoaneurysm associated with various surgical treatments of the lower extremity trauma or disease have been reported3,5,7,9, however, a pseudoaneurysm after intramedullary nailing of the tibia fracture was rarely reported3. We describe the occurrence of a case of a pseudoaneurysm of the anterior tibial artery by the distal locking screw in intramedullary nailing of a tibial shaft fracture.

CASE REPORT

A 56-year-old man who sustained injury in an automobile accident was presented with a fracture of his left tibia at the mid-diaphysis and deep abrasion over the anteromedial aspect of his distal leg. On the seventh hospital day, an usual closed intramedullary
nailing with static interlocking screws was performed. The proximal and distal locking screws were inserted through the lateral stab incisions to avoid further injury of the preexisting skin abrasion on the medial side of the distal leg (Fig. 1).

On the tenth postoperative day, the patient happened to notice an enlarging, tender soft mass adjacent to the distal skin incisions for the distal locking screws and informed us of it. Upon examination, a bluish, 1.5 × 1.5 cm sized soft mass with mild tenderness and pulsatility was palpated and a bruit was auscultated. It could be easily pressed-down by finger tip and protruded soon within seconds after release (Fig. 2).

Because a pseudoaneurysm was suspected, an ultrasonography and angiography of the left lower extremity was taken to confirm and find out the location. The ultrasonography revealed a hypoechoic oval lumen with lightly echogenic wall and the Doppler color flow imaging showed a motion from red blood cells in color.

The femoral angiography revealed a well-defined, round pseudoaneurysm 2 cm in diameter originating from the anterior tibial artery adjacent to the proximal one of the two distal locking screw heads (Fig. 3A, B).

Fifteen days after the intramedullary nailing, the pseudoaneurysm was explored. The sac was located underneath the anteroposterior and lateral plain radiographs of the left tibia showing fracture reduction with intramedullary nail and locking screws. 

Fig. 3. A: Anteroposterior and B: lateral angiographs of the left leg showing a pseudoaneurysm, originating from the distal portion of the anterior tibial artery, and filled with contrast medium, adjacent to the distal locking screw. C: Intraoperative photograph of the anterior tibial artery revealing a small, longitudinal laceration (arrow) just behind of the distal locking screw.
rior tibial muscle belly. After splitting the overlying muscle and evacuating the hematoma, the anterior tibial artery was exposed just behind the head of the locking screw and a 5 mm longitudinal laceration of the lateral wall of the anterior tibial artery was seen at the level of the screw head. There was no gross arterial disruption (Fig. 3C). We removed that locking screw and reinserted it through the opposite, medial stab incision to protect the lateral, pre-injured site at the time of permanent removal of the locking screws and intramedullary nail. The injured segment of the artery, about 2.5 cm in length, was resected and the defect was grafted with a superficial vein harvested from the dorsum of foot. On the 6th month as the last follow-up, he remains asymptomatic, and no further complications have been experienced.

**DISCUSSION**

Vascular compromise with fracture management may threaten the extremities. The partially ruptured vessel, which may be associated with a fracture or its management, may not contract and results in continuous bleeding and formation of a hematoma. The adjacent portion of the hematoma may recanalize and connect with the lumen of the vessel. The cavity may become lined with endothelium and develop a pseudoaneurysm. Since the wall of a pseudoaneurysm does not contain elastic fibers, a continuous arterial pulse may increase the size of a pseudoaneurysm.

The pseudoaneurysm usually presents itself as a swelling in the early postoperative period, but it sometimes develops as late as months after surgery. Since not all pseudoaneurysms close spontaneously and the untreated pseudoaneurysm may rupture spontaneously due to another trauma, surgical repair with or without vessel graft would be advisable as it was in this case in order to prevent limb threatening complications.

As a surgical treatment of a tibial shaft fracture, an intramedullary nailing with interlocking screws is very useful and potential arterial injury is quite rare. When an arterial injury does occur during an intramedullary nailing, it would be secondary to the drill bit or tip of the locking screws. Delayed erosion of a vessel wall by the head or tip of the locking screw may also occur.

It was suspected that the cause of the pseudoaneurysm in this case was a partial cut of the lateral wall of the anterior tibial artery by a scalpel. Because the distal portion of the anterior tibial artery travels along the lateral cortex of tibial shaft and interosseous membrane, it is less mobile and it would be more susceptible to injury during the intramedullary nailing with interlocking screws by the tip of a scalpel in the way of making a lateral stab incision, by bone drilling or by the distal locking screws near this artery.

Therefore, the vascular injury can be prevented by a small stab incision of the skin and careful blunt dissection of the deeper tissue, by use of the guiding sheath in drilling, by avoiding long screws and short nails and, a little bit internal rotation of the nail that can increase the distance between the interlocking screw head and the anterior tibial artery would prevent the intraoperative vascular injury.

**REFERENCES**