**THE EFFECT OF SURGICAL DISSECTIONS ON BLOOD FLOW TO THE TIBIAL TUBERCLE**

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**Introduction**

Lateral patellar subluxation may be caused by an imbalance between the medial and lateral muscle forces on the patella, medial displacement of the patellar groove, a shallow or incompetent patellar groove, or a lateral displacement of the tibial tubercle. Both the lateral patellar release and vastus medialis advancement are often insufficient to correct mechanical abnormalities and prevent progressive subluxation. Furthermore, a realignment of the patella may be complicated by the need to disturb the blood supply to the tibial tubercle. Tibial tubercle transfer is often used for patella maltracking. In this procedure, the periosteum of both sides of the tibia is stripped off along the tibial tubercle and then the periostelia of the tibial tubercle and anterior part of the knee. The anterior part of the tibial tubercle was left intact when tibial tubercle transfer is performed. However, it is not a well-known blood supply of the tibial tubercle. This study examines the blood supply to the tibial tubercle. The purpose of this study is to investigate the blood supply to the tibial tubercle in an animal model using the hydrogen washout technique.

**Materials and Methods**

Eleven knees from nine mongrel dogs weighing from 7.0 to 19.1 kg were used. Each dog was anesthetized by intermittent intravenous pentobarbital. A longitudinal incision was made in the anterior part of the knee. The anterior part of the tibial tubercle was exposed. A 0.5mm-diameter platinum wire electrode was placed tightly in the tibial tubercle through a drill hole. A mixture of oxygen (50%) and hydrogen (50%) was delivered to the animal through a nose cone. The blood flow was measured using the hydrogen washout technique. The rate of blood flow was calculated from the half-time decay of hydrogen from the tibial tubercle and expressed as milliliters per minute per 100g of tissue. As a tissue partition coefficient for the tibial tubercle, the authors used the bone marrow value of Whiteside et al. The arterial blood pressures were monitored continuously from the right brachial artery and were controlled by varying the rates of fluid administration and the depth of anesthesia. After the control blood flow rate was determined, the blood flow rate was measured after each of the following procedures. 1) A lateral periosteal dissection was performed along the tibial tubercle (L.P.D). 2) An osteotomy of the tibial tubercle was done in the frontal plane starting posterior to the proximal insertion of the patella tendon above and proceeding distally and anteriorly to a point a few millimeters above the lower end of the tibial tubercle. The periostium of the medial side of the tibia was left intact. (B.T.S). 3) A distal periosteal dissection and osteotomy displaced cortis or dissected were carried out transversely to the long axis of the tibial tubercle. The bony segment was elevated using an osteotome from the lateral side with the medial periosteum still attached. (D.P.D). 4) Finally, a medial periosteal dissection was performed from the tibial tubercle (M.P.D).

**Results**

Before performing the surgical procedures, the control blood flow rate of the tibial tubercle averaged 19.6ml/minute per 100g of tissue. The blood flow rate did not significantly decrease after a dissection of the periostium on the lateral side of the tibia alone (p>0.05). After the tibial tubercle osteotomy, the blood flow rate averaged 11.5ml/minute per 100g of tissue, a 26% decrease as compared with the value after a dissection of the periostium on the lateral side of the tibia alone (p<0.05). The blood flow rate significantly decreased to 3.4ml/minute per 100g of tissue after the distal periosteal dissection (p<0.05). The addition of the medial periosteal dissection caused a complete arrest of blood flow in ten out of eleven knees, or a 99% decrease as compared with the value after only a distal periosteal dissection (p<0.05).

**Conclusion**

Our experimental study demonstrated in an animal model that 99% of the blood flow to the tibial tubercle was supplied by the vessels through the medial periostium. The present results may explain rapid bone healing after our new surgical technique which preserves the periostium of the medial side of the proximal tibia.

**Reference**


**Blood flow(ml/min/100g)**

![Graph showing blood flow](image)

**Fig 1. Blood flow to the tibial tubercle.**

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