No. 5.

미세 혈관 문합방법에 따른 실험적 비교

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미세봉합사를 이용한 미세혈관 문합술은 숙련된 수술수기를 요할 뿐만 아니라 수술에 많은 시간이 소요되고 끈기를 요하는 어려움이 많다. 미세혈관 봉합방법에는 대표적으로 단속봉합(interrupted suture)과 연속봉합(continuous suture)방법이 있으며 최근에는 봉합사를 사용하지 않고 간편하게 봉합할 수 있는 접합 기구가 개발되었다.

저자는 흰쥐 대퇴동맥 20례(0.5~1.0mm, 평균 0.7mm) 대퇴 정맥 20례(0.8~1.6mm, 평균 1.2mm) 총 40례에 각각 20례씩 단속봉합과 연속봉합을 시행하였으며 유약가토의 경동맥 15례(외경 : 1.0~1.6mm, 평균 1.3mm)와 안면 정맥 12례(0.9~2.2mm, 평균 1.5mm) 총 27례를 대상으로 단환성 기구(Unilink apparatus)에 의한 미세혈관문합술을 시행하여 다음과 같은 결론을 얻었다.

1. 문합후 개존율은 동맥의 경우 단속봉합군 및 연속봉합군 모두에서 각각 20례 중 18례로 90%였고, 단환성 기구사용의 경우 15례 중 14례로 93%였다. 정맥의 경우 단속봉합군 20례 중 18례로 90%, 연속봉합군 20례 중 16례로 80%였으며, 단환성 기구사용의 경우 12례 중 9례로 75%의 개존율을 보였다.
2. 동맥 문합시 소요된 시간은 단속보합군에서 평균 12.2분, 연속봉합군에서 평균 10.3분, 단환성기구 사용군에서 평균 8.5분이었다. 정맥 문합시 소요된 시간은 단속봉합군에서 평균 12.2분, 연속봉합군에서 평균 11분, 단환성기구 사용군에서 평균 6.2분이었다.
3. 술후 현미경 소견상 봉합군에서는 술후 1일에 혈관벽에 혈액응괴(blood clot)의 소견을 보였으며 봉합시에 혈관벽의 손상과 과도한 긴장벽에 의한 조직의 괴사로 중막 및 내탄력막이 상하였다. 술후 2주째 부터는 중막의 비후성 반응과 내막하 비후 현상이 관찰되었다. 단환성기구 사용군에 있어서 단환핀 내부의 혈관은 내막세포 배열은 유지하고 있었으나 내막 및 중막의 위축에 의한 혈관벽의 감소가 보였다.
4. 술후 이물반응은 단속봉합군과 연속봉합군, 단환성기구 사용군에 유의한 차이는 관찰되지 않았다.
5. 술후 합병증으로 단환성 기구 사용시 동맥 1례에서 수술후 15분에 단환핀이 플리는 경우가 있었다.
6. 봉합군에 있어서 혈관의 개존에 영향을 미치는 가장 중요한 요소는 혈관절단단의 정확한 연결이며, 단환성 기구 사용시 수술수기에 있어서 중요한 요소는 적당한 크기의 단환핀 선정 및 두 단환핀의 정확한 밀착 등 이었다.

저자들은 혈관 외경의 크기에 차이는 있었지만 봉합군과 비봉합군에 있어 단환성 기구의 사용시 수술시간을 절약할 수 있었으며 특히 정맥의 문합시는 봉합군보다 장점이 많았다. 그러나 1mm 이하 혈관의 문합에 있어서는 봉합이 필요하였으며 단속봉합보다는 연속봉합이 수술 시간상 유리하였다.

No. 6.

"No-Reflow"현상에 대한 Urokinase 압력주입의 효과

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최근 미세수술의 발달로 사지와 손가락의 재접합술에 있어서 90~95% 이상의 성공율이 있지만 허혈

1. 29 cases of total 30 cases were successful and can be obtained the excellent results in fuctional and cosmetic aspect.
2. In postoperative complications, one case is graft failure, six cases in partial skin necrosis, one case in malunion, 15 cases in resorption of grafted iliac bone and among them one case of fatigue fracture of grafted bone.
3. Even if the 1st metacarpal neck amputation is occurred, thumb reconstruction with a free neurovascular wrap-around flap was also possible, however, the limitation of the mobility of the reconsructed thumb and resorption of grafted bone piece were come out.

We conclude that cosmesis and fuctional results were quite satisfactory despite of some complications. The thumb reconstruction with a wrap around free flap from the big toe in thumb amputated patients is the excellent method in the cosmetic and fuctional aspect and can be considered as the most useful method because of less morbidity to the dornor site and the operator should be trained to get the meticulous microsurgical technique and to detect the complications.

No. 5.

Experimental Study of the Anastomosis with Suture vs Non-suture Technique

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Suture microvascular anastomosis is time-consuming and tedious and demands long and continuous training. Technique of anastomosis of microvessel was presented interrupted suture and continuous suture. Recently the Unilink instrument system is created as a fast and simple method to achieve high patency rates without long and continuous training in the anastomosis of small vessels.

The author experimentally studied the femoral artery of 20 mice (0.5-1.0mm, av. 0.7mm), the femoral vein of 20 mice (0.8-1.6mm, av. 1.2mm) after anastomosis with interrupted suture in 20 cases and continuous suture in 20 cases. For the unilink apparatus we used the carotid arteries of 15 cases in 14 rabbits (1.0-1.6mm, av. 1.3mm) and facial veins of 12 cases in 14 rabbits (0.9mm-2.2mm, av. 1.5mm). A total of 27 arterial and venous anastomoses were performed. We examined the postoperative patency at immediate, 2 weeks, and 8 weeks. The results were as followings.

1. In the arterial anastomosis the rate of patency was 90% (18/20) in interrupted suture, 90% (18/20) in continuous suture and 93% (13/15) in unilink apparatus. In the venous anastomosis the rate of patency was 90% (18/20) in interrupted suture, 80% (16/20) in continuous suture and 75% (9/12) in unilink apparatus.
2. The mean time for completion of the arterial anastomosis were 12.2 minutes in interrupted suture group, 10.3 minutes in continouous suture group and 8.5 minutes in unilink apparatus group. The mean time for completion of the venous anastomosis were 12.2 minutes in interrupted suture group, 11.0 minutes in continuous suture group and 6.2 minutes in unilink apparatus group.

3. At the histological examination of suture group, hyperplastic reaction of middle layer and subintimal hyperplasia were observed. In unilink apparatus group, the endothelium layer was continued and the thickness of vessel wall was decreased due to moderate atrophy of the media and mild degree of nonspecific chronic inflammation were seen around the unilink apparatus.
4. No significans was noticied in foreign body reaction among the interrupted, continuous and unilink apparatus group.
5. A case of the arterial anastomosis was released with acting out at 15 minutes after operation.
6. The important factors in the technical problems were accurate apposition of the cut vessel edges in suture group and the proper selection of the ring size and optimal fitting between two rings in unilink apparatus group.

Even though the outer diamater of vessel in suture group was different from that in unilink apparatus group the unilink method provides a very safe, fast, and simple way to perform microvascular anastomoses especially in anastomosis of vein. But however suture was needed in vessels below 1 mm outer diamater. In that situation continuous suture was benefit than the interrupted suture in operation time.

No. 6.

The Effect of Pressure Injection of Urokinase to Reverse the "No-reflow" Phenomenon

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Microsurgery has advanced beyond its nascent stages reaching success rates of 90% to 95% However, this means that even in the best circumstances, 5% to 10% of free flaps and replants fail. Almost all failures are due to vessel thrombosis, resulting in ischemia of the transplanted tissue. Many attemps have been undertaken to treat and reverse its effect. Zdeblick and colleagues noted an improvement in the viability of amputated limbs replanted after an extended period of ischemia following intraarterial infusion of urokinase. subsequent studies have inverstigated many modalities of urokinase administration in various animal models for differing ischemic periods. these studies, however, have failed to establish a definitive, generally accepted protocol for administration of urokinase in the salvage of tissue subjected to prolonged ischemia. Our clinical observations suggest that a bolus of urokinase delivered under high pressure may increase the thrombolytic effect of the drug, probably by means of increased delivery to microvasculature. We intend to investigate, the role of selective high pressure perfusion of ischemic flaps as a new means for increasing the effectiveness of urokinase in the treatment of the "no-reflow" phenomenon. A total of 32 male New Zeeland rabbits will be used and the animals were divided into the four groupa according to the method of infusion. After 14 hours of ischemia the flaps will be injected with Lactated Ringer's solution or with urokinase and the percent survival of the flap was determined 7 days following flap reperfusion. As the result, the flap survival rate was highest in the pressure injection of urokinase group.