Letter to Editor

Neurological Improvement of Injured Sciatic Nerve Following Omental Transplantation
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INTRODUCTION
I read the article by Ozkan and colleagues(7) with interest. The authors administered intraperitoneally in rats, erythropoietin (EPO) following transect and repair the sciatic nerve and observed that EPO treatment increased axonal regeneration. The functional recovery of the sciatic nerve was better during the third and fourth months after the operation than in the first weeks. Moreover, they observed that repeated EPO administration was not found more effective than single dose therapy. It seems that these results were due to a Schwann cell proliferation(2,6,10) in the transected sciatic nerve.

Likewise, previous studies in rats have reported that the histological and functional recovery of the injured sciatic nerve can also be feasible after transplantation blood-derived CD 133 cells embedded in atelocollagen gel into a silicone tube(4) or following to inject nerve growth factor into the silica gel conduit(10). These above-mentioned studies were performed into rats and in sciatic nerves with acute injury. On the contrary, since December 2007, we have observed that placing omental tissue round the injured sciatic nerve, we can improve the function of the foot and leg (unpublished observation).

My colleagues and I treated to a 26-year-old woman who there was underwent right sciatic nerve injury during a prosthesis at the hip, in June 13,2007. Immediately after the operation, she presented motor and sensory loss in her right lower limb, and later on, she received only rehabilitation. Personal history: At the age of 2.8 years, she suffered tonsillitis, septicemia and shortly after, arthritis in interphalangeal, knee and hip joints. She received treatment with antibiotics. Two months later, she presented pain located in both of them hips, and subsequently, difficulty to walk. During her childhood and adolescence she was attended in the Instituto Nacional de Rehabilitación, in Mexico city.

The examination showed to a patient in wheelchair and in a good state of nutrition. She presented shortening of the right pelvic limb on 3 cm, and flatfoot. Hypotrophy, hypotonia and hypothermia in her leg and foot. Her motor evaluation was as follows: Toes (grade 0), foot (grade 0), leg (grade 0-1), thigh (grade 1-3) and hip (grade 4).Anesthesia in the leg and foot, and moderate hypesthesia on the cutaneous zone of the minor sciatic nerve. Indifferent plantar response. Two electrodiagnostic test revealed absence of motor and sensory neuroconduction in the tibial, peroneal and major sciatic nerves. Before surgery, the patient’s status was recorded on videotape.

In December 12, 2007, an omental transplantation (free omental graft with vascular microanastomosis) was performed without complications. The major sciatic nerve was located through a vertical incision on the posterior surface of the right thigh, at the level its apparent origin. During the surgery we found(9) : 1) fibrous tissue round the major sciatic nerve and its collateral branches; 2) several venous
vessels with thrombosis, and 3) paleness and moderate hypotrophy (reduced to 75 per cent and 5 cm length) at the proximal portion of the major sciatic nerve. The distal segment of the omentum was wrapped round the injured sciatic nerve. Basically we used the same surgical technique, that in patients with an ischemic leg due to complete obstruction of the femoral artery above the knee (1,5,6). Objective neurological improvement occurred beginning the second day after surgery. The temperature in the right lower limb increased, and the voluntary movement of the thigh and leg improved. Likewise during the first days the right flatfoot was corrected to its normality. During whole postoperative evolution she has received rehabilitation. Presently after 29 months of follow-up, the motor evaluation is: toes (grade 0-1), foot (grade 1-3), leg (grade 2-4), and thigh and hip (grade 5). Moreover, she present moderate hypesthesia in the leg and foot, and normal sensory in the thigh. She can walk with help of orthopedic devices on the right leg and foot.

Unlike the experimental observations in rats (2,4,7,10), we believe that our results were due to three factors. First, surgical liberation of the sciatic nerve; Second, functional recovery of axons in the residual sciatic nerve, and Third, because of axonal regeneration (2-4,9). Neurological improvement of their thermoregulatory, sensory and motor mechanisms was better during the first days or weeks after surgery than in the following months or years. A result similar to previous observations into patients with chronic injury in the spinal cord (8) and optic chiasma (9). So therefore, our results indicate that axons in ischemia and ischemic penumbra in the residual sciatic nerve can improve if circulation is restituted through the omentum, and later on, because of axonal regeneration (2,3,7,8). Because the omentum promotes the neoformation of blood vessels (angiogenesis) since the 6 hours after the surgery and, through omental penetrating neovessels in the injured sciatic nerve, it receive an increase in blood flow, oxygen, neurotrophic factors, neurotransmitters, adipocytokines and omental stem cells (3,8-10). Thus, we believe that our neurosurgical technique provided from the first, a revascularization to the ischemic sciatic nerve and later on, adult mesenchymal stem cells for differentiating into multiple cell types including Schwann cell proliferation. These results, as well as the functional recovery of the ischemic optic chiasma (9) confirms that placing omentum directly on or round the injured nervous tissue can lead to neurological improvement. Likewise, based in these observations, I think that an omental transplantation on the anterior and lateral surface of the medulla oblongata, it could improve the function of the ischemic pyramids due to atherosclerosis in the V4 segments of the vertebral arteries.

In conclusion, these experimental and clinical observations indicate that is feasible improve the function of axons into the injured nervous trunks such as sciatic nerves and brachial plexus after an omental transplantation. Moreover, the amount of adherent scar in the omental-nervous tissue interface is minimal or absent.

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