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Editorial

Omentum: Power to heal and regenerate

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INTRODUCTION

The omentum, an apron-like structure attached to the greater curvature of the stomach, is made of adipose tissue speckled with islands of a compact tissue containing macrophages, lymphocytes, and hematopoietic cells ('milky spots') (1). It is a highly expandable structure that has the innate ability to sense injured sites in the abdominal cavity and adhere to them. It also reacts to cells and embryonic tissue introduced into the abdominal cavity or inserted directly into the omentum by extending its blood vessels into the implanted tissues. On sensing inert foreign-bodies it rapidly spreads to encapsulate them, as if to protect the internal organs from contact with them. As the omentum becomes activated, the milky spots (rather than the adipose tissue) become reactive and expand. After fusing with the injured tissue, the activated omentum brings about vascularization, debridment, hemostasis, healing, and regeneration of the tissue.

These unique biological properties of the omentum have long been noted and applied in surgical practice. They are due to an exceedingly rich lymphatic supply and a unique cellular composition. In practice, such effects can be delibrately brought about by surgically extending the omentum and suturing to injured tissues in a procedure called omental transposition.

Vascularizing ischemic tissue by omental transposition

For a long time the omentum was thought to have no specific functions and rather to be a nuisance for surgeons. Nonetheless, a few recognized its remarkable ability to facilitate wound healing and prevent infections after surgical procedures. In France, during the first part of the 19th century, Jobert de Lamballe, physician to Louis-Phillipe and later to Napoleon III, noted that the omentum was forming adhesions around injured bowel and postulated that this was preventing the development of peritonitis in soldiers injured in the battlefield. In 1880, the American surgeon Nicholas Senn wrapped the omentum over bowel anastomoses and reported that the procedure strengthened the sutures. In 1908, in recognition of its properties to protect the gut from infections, the British surgeon Morrison called the omentum "great policeman of the abdomen." In Germany in 1926, Knazozovicky successfully detached the omentum and used it for arthroplasty. There followed several reports of using the detached omentum as a piece of autologous tissue to repair vesicovaginal fistulas or as a source of new blood vessels to revascularize areas damaged by ischemia (this historical account has been summarized from refs. 1, 2).

In 1945, Carnady tailored the omentum into a long pedicle by cutting its attachment to the stomach without disrupting its vascular supply. He directed the omentum under the skin and extended it to the site of a severely infected compound fracture of the forearm. The omental graft helped overcome the infection and saved the exposed tendons and nerves, ultimately resulting in a fully functional arm (3).

In the era before coronary artery bypass graft surgery, omental transposition was used to improve the blood supply to the myocardium. O'Shaughnessy applied an omental pedicle to the pericardium-free myocardium in dogs and later in humans, and demonstrated angiographic evidence of neovascularization of the myocardium as well as relief of anginal pain and improved functional status (4). Later this procedure was expanded by Knock et al (5) and eventually widely applied in clinical

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