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ETHICAL PROBLEMS IN TRANSFERRING THE GREATER OMENTUM TO REPLACE SOFT TISSUE DEFICIT AT THE LIMBS' LEVEL

KEY WORDS: Greater Omentum, Ethical Problems, Surgical Transfer.

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ABSTRACT

The greater omentum has long been considered an element without great biological significance, a piece of inert tissue, an appendage. However, the situation has changed in the last hundred years, proved by the many studies and medical researchers conducted to value and enhance the importance of this human anatomical part. They say the greater omentum has a huge therapeutic potential. The variety of surgical applications can be mainly used in the revascularization of the affected areas that have lost tissue, especially soft tissue. The area of the extremities affected by any kind of accidents, with important results in the above-mentioned fields, draws an even bigger interest, since this biologic element represents a solution in many cases that in the past ended up with the amputation or shortening of the affected limb. The method approached in this paper is a literary review and its purpose is to identify and make people aware of the ethical problem that is specific to the transfer of greater omentum in order to repair the vascular tissue deficit when the extremities are affected. As a conclusion of the research, we can say that regardless of how complicated the medical intervention involving a patient and at least a limb of the medical team, the ethical aspects always delimitate the therapeutic decisions, ensuring their portability and moral reproducibility.

INTRODUCTION

The tissue deficit following a lesion of any kind or significant areas of tissue that are affected in the soft parts of the limbs that expose tendons and bones have always caused interest with the purpose of finding out the best solution for the patient who is caught between the necessity of amputating the limb as unique classical solution some years ago and the modern reconstructive approach with or without substance intake. Reconstructive surgery has always had daring essays when it comes to ensuring the patient that there is life after a critical event like the one mentioned above. The use of the greater omentum as a method of saving the limbs from being amputated has been supported ever since the XIX-th century, when in 1829 people started thinking of protecting the damaged viscera by using this anatomic structure.

Although having an important history in intra-abdominal reconstructions since the end of the 1880s by getting involved in the strengthening of intestinal anastomoses and the closing of perforated duodenal ulcers (discovery belonging to Senn and Graham[1]), the value of epiploon is truly appreciated only in the second half of the XX-th century. In 1937 O'Shaughnessy[2] performed a cardio-omentopexy for controlling angina, then in 1945 Thompson[3] treated the bronchial-pleural fistula. The anatomical advantages of the omentum include the strong vascularization and its anti-bacterial and anti-neoplastic functions (Agarwal[4], Tamaş[5]).

MATERIAL AND METHOD

The method approached for this article is the literary review of speciality articles that are centred on the therapeutic surgical possibilities offered by the use of the big omentum in prosthesis for soft tissue areas in the extremities of the human body. For writing this paper we used articles from internationally recognized journals, indexed and ranked by ISI, and also international and national electronic data bases. When we searched the articles with the above-mentioned specific, we used English key-words like "greater omentum", "complications of the transfer of greater omentum", "ethical dilemmas during the transfer of greater omentum" and "the big omentum in diseases of the limbs". To this we can add our personal experience of analysing 50 cases that used this method at the Clinic of Plastic and Reconstructive surgery, within the Emergency Hospital in Iasi.

RESULTS

Studies show that the vascularity of the omentum is spread in two different planes, in the context of the embryological development of the four peritoneal layers. It derives in the anterior part from the right gastroepiploic artery with origins in the hepatic artery and in the posterior part it derives from the left gastroepiploic artery, with origins in the splenic artery. The number of the veins of the greater epiploon is bigger than the number of arteries. For each artery there are 2 veins, two to three times thicker than the corresponding arteries. Its main function is to protect the peritoneal cavity from infections, with the help of the so-called "milky spots", which represent areas on the greater omentum containing macrophage cells. Also, from what it is known, in the case of an intra-peritoneal infection, this anatomic structure surrounds and heals the affected area. The high lymphatic potential of the greater omentum enables it to absorb large quantities of endemic fluids and to remove metabolic residues and toxic substances[6]. In its structure, beside the growth elements, neurotransmitters and neurotropic factors, one can also identify stem cells that can turn into different types of cells. It can be used in complementing soft tissues in hemifacial atrophy, cerebral vascularization and compensating for soft tissue defects in the hand.

The systematization of the properties of this anatomic structure could be presented as follows:

- Strong vascularization – contains angiogenic factors that facilitate growth and the development of new blood vessels in any tissue where it is surgically connected, starting from the brain, backbone to the limbs (hands, feet);
- Power of absorbing edema – the lymphatic system of the omentum has a great capacity of absorbing edemic fluids;
- A source of stem cells – some reports show the presence of omnipotent stem that can differentiate into any type of cell[7].
- Immune support – the areas in the omentum that are also known as milky spots are able to generate specialized cells with a role in immunisation and treatment
- Lymphatic system – rich in lymphatic vessels and tissues with a role in removing metabolic residues, excess fluids, and also toxic substances
- Source of biologic material – the omentum represents a powerful source of biologic material that helps for the growth and development of tissues, neurotransmitters, factors for developing nerves and agents of control for inflammations

The use of the omentum in transplants for covering the deficit of soft tissue places this procedure in the category of transplants, even if in most cases the donor is also the receiver. In the specialized literature self-transplant, as a specific perimeter within

transplant as a medical science is often based on or contradicted with grafting, without a clear barrier between these two concepts. The difference could consist in the fact that a transplant implies not only a surgery procedure on the surface, but also re-establishing the blood flow whereas grafting represents only moving some parts and fragments from the same person to different parts of its own body. Remaining in the same semantic sphere, the isogenic graft made by transplanting parts of organs or whole organs between twins, or the allograft made by transplanting tissue between people belonging to the same species are completed by the xenogeneic graft or the transplant between animals belonging to different species ([8, 9]). The area covered by the transfer of omentum solves not only the problem of the soft tissues in the extremities of the body, but there have also been some methods applied to the spine, without always obtaining results of improvement of the neurological functions[10], but other times with the hope of some promising solutions[10], in cardiac ischemia, hepatic recovery and regeneration etc., especially for the compensation of affected vascularization that was poor at the moment of the surgery. In other words, gastrointestinal, cardiothoracic, vascular surgery, neurosurgery, plastic and reconstructive surgery, orthopaedic surgery, gynaecology and genital surgery, plus urology prove the potential of the greater omentum through a wide variety of works published.

You mustn't neglect the adverse effects and the complications of the donor following the reconstruction techniques that use the greater omentum, considering the more and more reports in the past two decades that include potential intestinal occlusions, post-surgical infections, the occurrence of abscesses, total necrosis of the greater omentum flap, hernias in the laparoscopic channels, the transfer of gastric carcinoid in the head and the neck area[11], or even death by cecal volvulus and rupture after transposing the omentum to the chest[12], etc. There are no known studies orientated on the complications of the donor. The patients who had an extraperitoneal reconstruction with pediculous epiploon reported a sensation of early satiety corroborated with transient obstruction of gastric emptying[13, 14]. Because of the potential intra-abdominal complications, there have been reports of contraindications to the use of greater omentum as a reconstructive flap.

The greater omentum has proved its functional usefulness in transfers with the purpose of compensating the loss of soft tissue in the extremities, especially in the upper and lower limbs. However, there are limitations when it comes to using the omentum flaps for large areas, like in the case of the lower limbs, in certain situations[15].

DISCUSSIONS

Surgery has always generated ethical dilemmas. By the nature of the interventions, surgery also means, besides the subject of surgery and the medical team, a specific therapeutic approach, supported by the appropriate logistics. More than ever, the balance between risk and benefits is negotiable in order to ensure the patient gets what is needed for obtaining the best possible quality of life.

The fact that there is an alternative to compensate vascularization in the affected areas by using the greater omentum, that has great characteristics of vascularization and also a strong adaptability to transfer during the process of self-transplant[15, 16], as it comes from the same body where it is transplanted, offers a wide range of options and surgical applications, but on the other hand expands the possibilities of specific complications. In the same order, surgical approaches with adverse effects always raise ethical problems, concerning the balance between risk and benefit for the patient. This way the therapeutic approach becomes a complex procedure in which the doctor-patient relationship is a piece in a larger puzzle that includes the patient, the medical team, medication, all the aspects of social integration of the patient and his/her family.

Despite the many advantages supported by the reports published in the medical journals[17, 18], the procedure of using the omentum implies associated risks, risks that are associated at least to the harvesting phase. This phase can often last up to a few hours and the procedure is obviously invasive, as it implies removing the omentum from the stomach and colon and at the same time ensuring the integrity of blood circulation and of the lymphatic system. This transplant process exposes the organism to two sources of infection risk – a source being the destination that is already affected and injured, meant to receive the graft of omentum, and another one that is willingly affected by the medical team as they remove the greater omentum from that specific area[19,20].

Regardless of the nature and complexity of the medical, the doctor-patient relationship is centred on the patient's interest, with the purpose of identifying the safest way to treat or control the medical condition of the patient. Autonomy and benefit for the patient influence the medical decisions and make the patient decide, involving him/her in the informed consent of the medical procedures and treatment. The patient has to know the risk factors associated to the possible complications following the use of pedicle flaps and these factors include mediastinitis and pulmonary insufficiency. The need of laparoscopic technologies and laparotomy combined with the above-mentioned intra-abdominal complications could not create a safe picture, the balance between risks and benefits in using the greater omentum for reconstructions being precarious. Thus the usage directions vary and remain uncertain, indefinite, and incomplete.

An interesting problem that is identified in certain situations when the greater omentum is used to replace the soft tissues in the extremities consists in ensuring temporary benefits for this anatomic formation, and also temporary benefits for the medical intervention in itself[15, 16, 21]. As the benefits are not obviously bigger than the risks, we consider it is justified to have doubts regarding the advantage of using the greater omentum in certain special situations[17]. The fact that it acts like a drug with a temporary effect brings further discussions on the topic of supplementary problems of the prosthetic area itself which shows an obvious risk of relapse and also the psychological impairment of the patient who was induced false positive expectations and who, in the end, lost a limb (suffered an amputation). We agree that it is difficult to predict the therapeutic result of a surgery, but on the other hand we are the spectators in an act where two main sets of values play: a set of values belonging to the physician and another belonging to the patient. According to the existing regulations referring to the relation between these two sets of values, the patients have the right to be involved in the decisions regarding their medical care. In the situations with a liminal potential, like the ones mentioned above, when despite the fact that the patient was informed about the potential side-effects, the result is extreme as the patient loses a limb, so the acceptance of the therapeutic approach does not always mean to make sure the patient has the right to decide for himself[22]. The possibility that some patients will not understand the results and the side-effects is often confirmed by the despair with which the patients accept the therapeutic approach. The decision of choosing a certain procedure or another should be based and supported by medical, social, legal and personal reasons. On the other hand, it is difficult for the doctor to apply ethical and medical principles into practice. In a case situated on the limit, the most important thing and always susceptible to dilemmas and ethical problems, is that the doctor's intervention will not harm. The success of the intervention is based on many factors, such as statistics that confirms the cumulated experience of a procedure, the doctor's experience which cannot always be part of the statistics from our field of interest, and also the personal, inner factors of the patient, which are often based on the above-mentioned factors.

Most ethical and bioethical discourses have the tendency to associate the ethical principles in medicine with medical research. This tendency can be justified by the history of medical research which was performed mainly by the Nazis during the Second World War. After the Nuremberg trial, the chain of events brings the Nuremberg Code to people's attention. This code states and defines the right decision, in the context of involvement in the

medical research, as being that form of representation of the human personality that implies an individual, a person who is capable of making decisions based on sufficient information regarding the nature and the predictable consequences of research, without some outer factors that can influence this decision, like coercion, scheming, conflict of interest or any other form of constraint.

CONCLUSIONS

It has always been difficult for the surgeons to approach open fractures of the lower limbs, especially when the soft tissue was affected on large areas and it has represented a challenge in identifying the best solutions and techniques for functional reconstruction and recovery. If in the past the only solution was to lose the extremity of the limb, today amputation or shortening of the limb is only an extreme situation, applied in isolated cases. Amputation or shortening of a limb affects personal life and social integration. The patient's autonomy affects in the end his/her relationship with the family, the members of the social group they used to be part of.

In the context of a medical procedure that implies grafts of greater omentum in the cases when the soft tissue in the extremities is affected, the existence of a precarious balance between the risks and benefits associated ensure the premises of a reluctant attitude to medical interventions that are based on this anatomic structure. According to the reports in the published literature, porting the medical treatment should be, in the limit situations, oriented towards ensuring an optimum result regarding the social integration of the affected patient, a good enough potential quality of life, so that the patient will not have the feeling of being socially useless, and will not have his dignity and status as an individual affected, the way he sees himself when reported to his own values. Every patient is a particular case, a special situation and only the results of the medical treatment can confirm the value of the medical approach.

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