Minimally invasive cardiac surgery in Brazil

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In the article "Cardiac surgery: the future is minimal!" Published in 2000, Michael Mack, in his ambiguous phrase, could predicted that the future of the cardiovascular surgeon would be guided in the search for a less aggressive approach to the patient, with smaller incisions, and if possible, without cardiopulmonary bypass (CPB), since the surgery had been losing ground to percutaneous procedures [1].

In the literature, we can find as a synonym for minimally invasive cardiac surgery the cardiac surgery performed without CPB, nevertheless, the term minimally invasive conceptually refers to surgery performed through small incisions, without direct access to the heart or other organ to be operated. In the 90s, with the creation of new surgical materials focused on endoscopic procedures, there was diffusion of minimally invasive surgery, especially in the field of thoracic surgery. The first published reports of minimally invasive coronary artery bypass grafting (CABG) were described by Robinson et al. [2], in which 16 patients underwent surgery with the aid of peripheral cannulation via the femoral vessels and left minithoracotomy, and, both of them presented good results. In 1996, Cosgrove & Sabik [3] reported minimally invasive aortic valve surgery. In the same year, Navia & Cosgrove [4] described a technique for minimally invasive mitral valve surgery.

The cardiac surgery, contrary to what is believed by many people, is increasing its incidence in National Hospital Centers [5], especially in the area of congenital heart disease, followed by valve surgery and coronary artery bypass grafting [6]. This growing demand includes minimally invasive and percutaneous procedures, justifying the increase of articles published in this area. It is still impossible to perform endoscopic procedures in pediatric patient with the materials in use nowadays. Diagnostic procedures, such as pericardioscopy, have been routinely used in some adult groups for cases of pericardial effusion of unknown origin, allowing the performance of biopsies in suspected areas and approach areas not reached by pericardial window [7]. The concern about the safety of direct aortic cannulation during surgery with smaller incisions was approached by Guedes et al. [8], which demonstrated the method safety. Poffo et al. [9] recently published their experience in this area, demonstrating a range of possible operations to be performed through a minimally invasive manner with peripheral cannulation, without complications due to cannulation and with good postoperative results. The same group demonstrated the possibility of performing the correction of associated heart diseases [10], as well as more complex techniques are also employed in minimally invasive manner [11]. At the same time, Guizilini et al. [12] demonstrated the benefits of ministernotomy for the preservation of lung function in the postoperative period of CABG.

Recent therapeutic alternatives, such as the left sympathetic block, have brought new perspectives for the treatment of dilated cardiomyopathy, which is being performed by videothoracoscopy with only two minimal incisions in the chest [13]. New imaging and instrumental methods bring back procedures that had fallen into disuse, such as percutaneous mitral valvuloplasty, which currently presents better and more lasting results [14]. Finally, the treatment of atrial fibrillation also proved to be feasible through a minimally invasive approach, as demonstrated by Colafranceschi et al. [15].

Several Brazilian authors have distinguished themselves for the innovation and development of new techniques with the rapid advancement of technology and the constant search for better results in the care of cardiology patients. The introduction of techniques for percutaneos and transpical aortic valve implantation as an alternative for patients with contraindications or high risk for conventional surgical treatment [16], has been widespread in Europe and the United States. Perin et al. [17] recently reported their initial experience with a unique type of prosthesis, transfemoral percutaneously implanted, while Gaia et al.

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[18] reported their experience with the implantation of a national prosthesis in transapical way, without CPB. In the area of robotics, the dissection of the right internal thoracic artery with the aid of da Vinci robotic system was described in Brazil, performed by median sternotomy [19]. Some authors have been presenting their experience with totally closed-chest robotic heart surgery in national congresses, however, the data is not published yet.

Taking into consideration this panorama of technological evolution, with longer surgeries, CPB is still a concern, because is one of the most responsible for cardiovascular surgery complications, especially those of neurological nature [20] and avoid or minimize it is also a major challenge for modern heart surgery. With increasing worldwide demand for the hybrid rooms that currently exists in the literature, we believe that the "gold standard" of cardiac surgery will be the minimally invasive surgery (video or robotic-assited), preferably without the aid of CPB and hybrid surgery (minimally invasive surgery associated with percutaneous procedures). Totally closed-chest myocardial revascularization robotic surgeries are a reality in some centers in the U.S. and Europe, and the anastomoses are performed with the use of mechanical devices without the use of CPB [21], with a continuous suture with or without the use of CPB [22,23], where the grafts are tested by means of flow meters with probes inserted into the chest. The hybrids myocardial revascularization surgeries also promise better results with fewer invasions, as well as the permeability of grafts visualized by intraoperative angiography, adding greater safety to these procedures [24].

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