

Text

Minimally invasive is now competing with COVID 19 in the surgical world. The phrase minimally invasive is a misnomer. Ludwig Rehn (1896), Charles Bailey (1949), Lewis (1952) and Walton Lillehei used minimally invasive techniques which meant that the blood circulation was not diverted, circulated outside the human body or otherwise damaged while operating on the heart. For direct vision cardiac surgery inflow occlusion was one such pioneering technique ¹ just as Closed mitral valvotomy ².

The need for an unhurried and precise correction of intra cardiac abnormalities was the impetus for developing the heart lung machine. Walton Lillehei used the parent as the heart lung machine ³, before a mechanical device was invented by Gibbon. These two developments triggered an enthusiastic attempt that introduced deleterious invasion of the human circulation in the living person. The parts of the heart lung machine like Cannulae, the plastic tubing, Reservoir, Oxygenator, Heat exchanger, Pumps created destruction of blood elements and disturbance of the internal regulation that took many years to discern. These destroyed the circulating blood cells, damaged the endothelium, produced abnormalities in coagulation with a cascading inflammatory response. This was true invasion of the human body for surgery and it remains so even today despite phenomenal scientific advances which have reduced the incidence of the deleterious effects of invasion. It also enabled correction of complex cardiac anomalies saving millions of lives that would have been lost. The principal ingredient was the the time period for the extracorporeal circulation that actually produced maximal invasive damage. Over a four decade period it became apparent that Cardiopulmonary bypass (CPB) time was directly proportional to the damage caused by the

invasion and the inflammatory cascade that increased mortality and morbidity. Conventional techniques improved to a large extent to reduce the CPB time considerably as experience and skills were acquired.

Minimally invasive techniques were introduced in the early nineties by avoiding the use of CPB for many surgeries. The best example was Coronary bypass surgery (CABG) with a limited incision and avoiding CPB (Kolesov *4*, Favoloro *5*). Off pump CABG is now standard and has really been the best development in minimally invasive cardiac surgery (MICS) techniques. In these procedures time taken was inconsequential because the CPB was not used.

More recently the term “minimally invasive “ has been grossly misused to denote small incisions and complex surgical techniques that are fraught with higher risk, excessive cost and unheard of complications. Many of these procedures use much longer CPB time thus increasing the invasive time despite their claims to be minimally invasive. This editorial particularly addresses the meaning of minimally invasive techniques. They are not small incisions, cosmetic incisions, sophisticated cannulation techniques. As long as they use CPB for even a short period of time they are as invasive as the conventional procedures *6,7*.

Numerous published articles *8,9* beyond the scope of this editorial which advocate and encourage the development of these procedures must show evidence of avoiding CPB altogether or change the term to small incision surgery or cosmetic incision surgery *10,11*. The surgeon should also explain clearly to the patient that invasion is not minimal only the incision is. They must also explain the additional risk of conversion to midsternotomy, need for additional imaging, complications of cannulation and likelihood of

cerebral dysfunction. This will help patients to choose the less risky procedures rather than be attracted by the misused terms, advertisements and overenthusiastic surgeons.

References

1. Lewis, JW, Taufic M, Closure of atrial septal defects with the aid of hypothermia . Experimental accomplishments and report of one successful case. *Surgery*;33:52-59

2. Bailey CP, Surgical treatment of Mitral stenosis (mitral commissurotomy),
Dis Chest,1949;15:377-379

3. Lillehei WC, Cohen M, Warden HE, Zeigler NR, Varco RL, The results of direct vision closure of ventricular septal defects in 8 patients by means of controlled cross circulation,
Surg Gynecol obstet,1955;101:446-466

4. Kolesov V, mammary. Artery-coronary artery anastomosis as a method treatment for Angina pectoris, *J Thorac Cardiovasc Surg*,1967;54:535-544

5. Favalaro RG, Saphenous vein autograft replacement of severe segmental coronary artery occlusion, *Ann Thor Surg* 1968;5:34-339

6. Cooley DA, minimally invasive valve surgery versus the conventional approach
Ann Thorac Surg 1998;66:1101-1105

7. *Myocardial Protection*

Editor: Salerno TA, Ricci M, 2004 Futura, Blackwell Publishing pp: 203-206

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8. Ghoreishi M, Thourani VM, Badhwar V, et al, Less-Invasive Aortic Valve Replacement: Trends and Outcomes from the STS Database

<https://doi.org/10.1016/j.athoracsur.2020.06.039>

9. Less invasive aortic valve surgery: rationale and technique, Von Segasser LK, Westaby S, Pomar J, Loisançe D, Groscruth P, Turina M, Eur.J Cardiothorac Surg 1999 15; 781-785

10. Kumar AS, What is minimal in minimally invasive cardiac surgery, Asian cardiovascular & Thoracic annals, 2020;28:339-340

11. Sampathkumar A, Less invasive aortic valve surgery, <https://doi.org/10.1016/j.athoracsur.2020.09.071>