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LESS INVASIVE CARDIAC SURGERY USING CONVENTIONAL INSTRUMENTS: AN INITIAL EXPERIENCE

Cardiology

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ABSTRACT

We have witnessed a widespread popularity and development of various techniques of minimally invasive cardiac surgery. However, the most important hurdle in MICS being commonplace is the need of specialised equipments and cannulae. We conducted a study, showing the effectiveness of upper and lower partial sternotomy as a less invasive surgical technique for various common surgical procedures utilising regular instruments meant for a standard full sternotomy. A total of 146 patients underwent cardiac surgery through partial sternotomy during the study period. Various surgeries viz Aortic and Mitral valve replacement, closure of ASD and VSD alongwith excision of Myxomas were done using partial sternotomies. In all patients, direct cannulation of Aorta and vena cavae was employed. None of the patients suffered from wound complication or sternal instability. Partial sternotomy thus can be utilised routinely as a safe procedure in various cardiac surgeries without the need of specialised instruments and cannulae.

KEYWORDS

Minimally invasive cardiac surgery, mini-sternotomy, lower partial sternotomy, conventional instruments

Today, almost every surgical discipline talks of minimal access surgery. Although cardiac surgery has been a late bloomer in regard to minimal access, it has rapidly adapted and evolved to accept minimally invasive cardiac surgery (MICS) as an integral part of the discipline. However, the popularity of MICS is somewhat limited owing to the need of special instruments and a separate learning curve for the surgeon. As a surgeon, the entire perspective of doing a surgery through midline sternotomy changes when surgery is done through a small lateral thoracotomy **[1]**. Additionally, the use of long and specialised instruments, use of camera vision and dependence on peripheral bypass are some of the factors which make the learning curve steep.

The advantages of MICS with regard to overall outcome and patient satisfaction has been well established **[2,3]**. However, the feasibility and reproducibility of a minimally invasive cardiac procedure is the biggest question asked.

In our study, we used partial, limited sternotomy instead of a full conventional sternotomy as a means of less invasive cardiac surgery. Apart from the advantage of having a smaller incision size, a partial sternotomy offers better stability to the sternum **[4],** and most importantly, the surgeon can utilise routine cannulation techniques for the surgery **[5]**. Specialised training is not required and it can be easily adapted in day to day practice.

MATERIAL & METHODS: The study is a retrospective, observational study. All patients who underwent cardiac surgery through a partial sternotomy at department of CTVS, SSKM Hospital, Kolkata were enrolled as a part of this study. The data was collected from hospital records and personal records of surgeons. Surgeries done via other approaches viz. small thoracotomy, port access surgery were not included. Surgeries done through partial sternotomy utilising specialised techniques e.g. peripheral cannulation, were also excluded. An arrowhead incision was used for sternotomy **(Fig.1&2)**. Routine cannulation strategy and myocardial protection strategies were employed. The only difference from a conventional midline sternotomy was the use of a smaller sternal retractor. Sternal closure was done using stainless steel wire, transversely placed, with additional wires through body of the sternum to fix the two segments **(Fig3).**

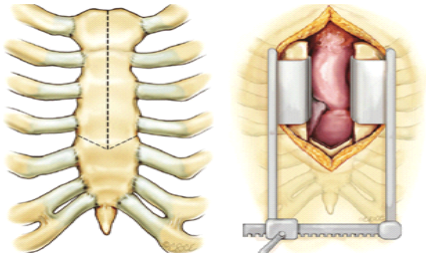

Fig 1. Arrowhead incision for upper mini sternotomy

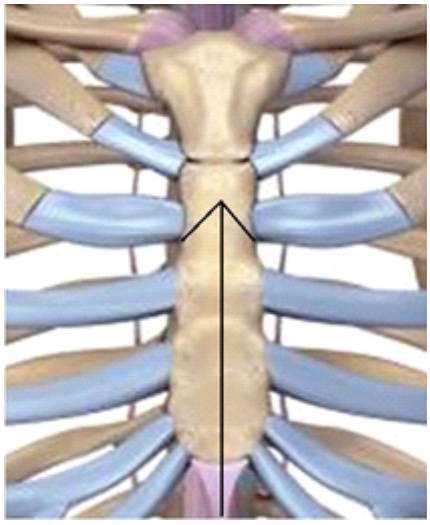

Fig 2. Arrowhead incision for lower mini sternotomy

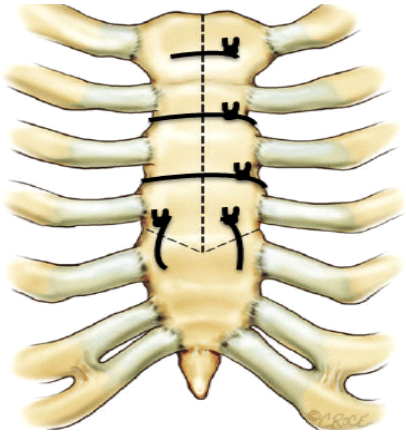

Fig 3. Representative image showing wire placement

RESULTS: A total of 146 patients underwent cardiac surgery through partial sternotomy during the study period **(Fig4)**. Among them 92 were female. All 36 patients of aortic valve replacement underwent surgery through upper partial sternotomy. Among the remaining 110 patients who underwent surgery through lower partial sternotomy, 49 has ASD repair, 43 underwent mitral valve replacement, 11 underwent

removal of LA myxoma and 7 underwent VSD closure. In all patients, direct cannulation of Aorta and vena cavae was employed. Antegrade cardioplegia was used in all cases.

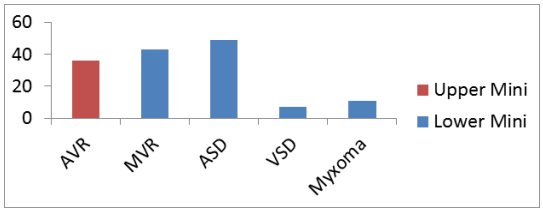

Fig 4. Distribution of various cases done through partial sternotomy

Re-exploration was required in 4 cases; one of them required conversion to full sternotomy. None of the patients suffered from wound complication or sternal instability **[6]**. There was no mortality.

DISCUSSION: Upper mini sternotomy is widely gaining popularity for various kinds of aortic surgeries worldwide. However, most of these centres employ femoral venous cannulation routinely for better visibility. In a developing country like India, cost effectiveness of cardiac surgery is extremely important to the masses. Moreover, femoral cannulation requires the support of trans esophageal echocardiography, which may not be easily available at all centres in adequate numbers. The arrowhead sternotomy used in our study provides better exposure and field of vision, so much so, that direct cannulation of the right atrial appendage can be done using a dual stage venous cannula, in almost all cases. In contrast, lower mini sternotomy is not commonly practised. In our study, we have shown that not only can it be safely employed in various surgeries e.g. Mitral valve replacement, ASD closure, VSD closure etc., it also provides better cosmesis and better chest wall stability due to intact manubrium **[7]**. The overall financial and cosmetic impact of limiting the skin incision over the lower part of sternum, without compromising the outcome **[8,9]** and without additional expenditure on specialised instruments and cannulae, is tremendous.

CONCLUSION: Partial sternotomy can be utilised routinely as a safe procedure in various cardiac surgeries without the need of specialised instruments and cannulae. Dedicated specialised training per se is not required for performing this less invasive technique. Further studies on safety and outcome can lead to its routine practice worldwide.

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