

Original Article



Demographic and Surgical Profile of the Patients Underwent Minimally Invasive Cardiac Surgery in a Rural Center of Bangladesh

Mahbub Ahsan¹, Lutfar Rahman², A S M Shariful Islam³,

Prokash Chandra munshi⁴, Md Muzibur Rahman⁵, Md Mezanur Rahman⁶

Abstract

Background: Ever Since its inception, minimally invasive cardiac surgery is growing rapidly for better convenience and superb post operative outcome. As newer instruments, surgical technique and operative exposure are increasing more and more patients are demanding minimally invasive cardiac surgery. **Objective:** The study was conducted to evaluate the various pre operative and peroperative factors in minimally invasive cardiac surgery. **Materials and Methods:** A retrospective observational study on the patients who underwent minimally invasive cardiac surgery in the department of cardiovascular and thoracic surgery, Khwaja Yunus Ali Medical College, Sirajganj, Bangladesh from January 2016 to December 2020. **Results:** A total of 40 cases were operated through minimally invasive cardiac surgery in our department. Maximum number of cases was Atrial septal defect (ASD), and minimally invasive direct coronary artery bypass (MIDCAB). About 62.50% were female, majority of patients were in the range of 11-15 years. Right anterolateral thoracotomy was done in 27 cases and left anterolateral thoracotomy in 10 cases. The maximum number of cannulation done in femoral artery and femoral vein, followed by direct superior vena caval cannulation and only a single percutaneous superior venacaval cannulation through internal jugular vein. In 14 cases the length of incision was in the range of 3-4 cm and 12 cases in 4-5cm. **Conclusion:** Minimally invasive cardiac surgery is now becoming more demanding. As more and more centers are opening the door to newer technology, common people are also becoming conscious about its excellent post operative outcome.

Key words: Atrial septal defect (ASD), Minimally invasive direct coronary artery bypass surgery (MIDCAB).

Date of received: 15.12.2020

Date of acceptance: 20.05.2021

DOI: <https://doi.org/10.3329/kyamcj.v12i2.55437>

KYAMC Journal.2021;12(02): 71-74.

Introduction

Minimally invasive cardiac surgery emerged as a new technique in cardiac surgery since 1996.

The society of Thoracic surgeons (STS) database defines minimally invasive cardiac surgery is any procedure not performed without a full sternotomy and cardio pulmonary bypass (CPB).

Navia and Cosgrove and Cohn performed first minimally invasive valve operation.^{1,2} In 1996, Carpentier first performed video assisted mitral valve repair through a mini thoracotomy.³ Late in 1998, Leipzig group used a 3 D videos cope with voice activated robot assistance in an operation.⁴ In the same year Carpentier and colleague first performed complete mitral valve replacement using Da Vinci Surgical System.⁵ Ever since its inception, minimally invasive cardiac surgery has been accepted as an alternative to conventional cardiac surgery for its

1. Assistant Professor, Department of cardiovascular and Thoracic Surgery, Khwaja Yunus Ali Medical College, Enayetpur, Sirajganj, Bangladesh.
2. Professor and HOD of Cardiovascular and Thoracic Surgery, Khwaja Yunus Ali Medical College, Enayetpur, Sirajganj, Bangladesh.
3. Assistant Professor, Department of cardiovascular and Thoracic Surgery, Khwaja Yunus Ali Medical College, Enayetpur, Sirajganj, Bangladesh.
4. Senior Register, Department of cardiovascular and thoracic surgery, Khwaja Yunus Ali Medical College, Enayetpur, Sirajganj, Bangladesh.
5. Professor and HOD of anaesthesia, Khwaja Yunus Ali Medical College, Enayetpur, Sirajganj, Bangladesh.
6. Assistant Professor, cardiac anaesthesia, Khwaja Yunus Ali Medical College, Enayetpur, Sirajganj, Bangladesh.

Correspondence: Dr Mahbub Ahsan, Assistant Professor, Department of Cardiovascular and Thoracic Surgery, Khwaja Yunus Ali Medical College and Hospital, Enayetpur, Sirajganj, Bangladesh, mobile: +88 01711174424, e mail: mahbub.ahsan8@gmail.com

minimum trauma, less cost and less hospital stay and increase patient satisfaction. Some centers adopt upper ministernotomy, lower ministernotomy, right, left thoracotomy, axillary approach, thoracoscopic and robotic procedures according to their case selection and expertise. On the other hand, a steep learning curve and technical difficulties in handling some steps such as myocardial protection, deairation, exposure and accidental trauma discourage many surgeons to opt for minimally invasive cardiac surgery.

Materials and Methods

We have done 40 cases of minimally invasive cardiac surgery (MICS) in the department of cardiovascular and thoracic surgery, Khwaja Yunus Ali medical college, Enayetpur, Sirajganj, Bangladesh.

The retrospective observational study was on the patients underwent MICS in between January 2016 to December 2020 in Khwaja Yunus Ali medical college, Enayetpur, Sirajganj, Bangladesh. All the patients intended to do MICS specially ASD (secundum), Aortic valve replacement specially mildly calcific valve, Mitral stenosis with moderate subvalvular changes, single vessel disease specially single lesion in LAD with preserved cardiac function are included in the study. Obese patients, patient with chest deformity, complex congenital were excluded from the study.

Surgical technique: Right anterolateral thoracotomy, Left anterolateral thoracotomy, ministernotomy. In right anterolateral thoracotomy, a 3-4 cm incision was given below mammary line in 4th Intercostal space (ICS). In left anterolateral thoracotomy, a small 3-4 cm incision in left 5th ICS below mammary line done. In ministernotomy, the incision began over manubrium and extended up to 4th space and then extended in the right 4th ICS in a J shaped fashion.

Data were taken purposively and presented in tables and charts. Ethical clearance was taken from IRB, KYAMCH.

Results

A total of 40 cases were operated. Of these, 25 cases were Atrial septal defect(ASD), aortic valve replacement (AVR) were 3, minimally invasive direct coronary artery bypass (MIDCAB) 10 cases, Mitral valve replacement (MVR) with wedge resection of lung, 1 cases, and simple MVR in 1 case.(Table.1)

Table I: Cardiac operation

Diagnosis	Number of case	percentage
ASD(Secundum)	25	62.5%
AVR	3	7.5%
MVR	1	2.5%
MVR +Wedge resection of lung	1	2.5%
MIDCAB	10	25%

Of these 40 patients, 25(62.5%) were female, and 15(37.50%) were male (Figure 1). According to distribution of age, 5 cases were between 5-10years, 12 cases were 11-15 years, 9 cases

each in 16-20 years and 21-30 years. 3 cases were >40 years and 1 case were between 30-40 years (Figure 2)

Figure 1: Sex distribution

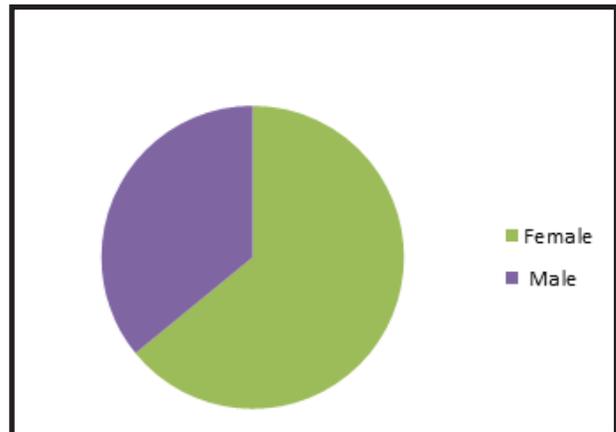
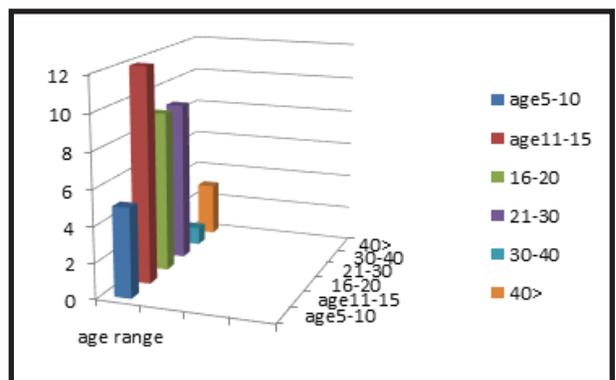


Figure 2: age distribution



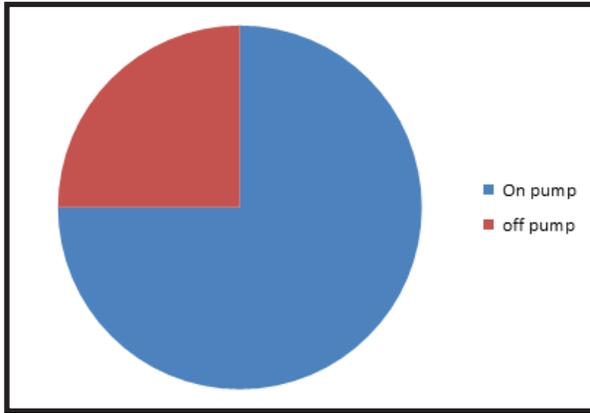
Regarding surgical approaches, Right anterolateral thoracotomy was done in 27 cases, left anterolateral thoracotomy was done in 10 cases and ministernotomy was in 3 cases (Table II).

Table II: Surgical approaches

Incision	Number of cases
Right anterolateral thoracotomy	27
Left anterolateral thoracotomy	10
Ministernotomy	3

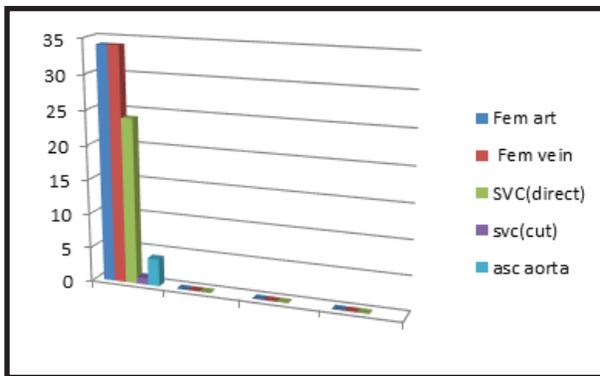
Regarding the use of cardiopulmonary bypass (CPB), we operated 9(25%) cases off pump and 31(75%) cases on pump (Figure 3)

Figure 3: Use of Cardiopulmonary bypass (CPB)



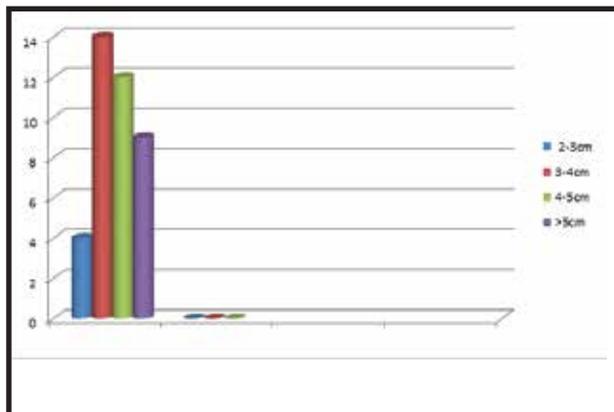
During MICS, we did femoral artery cannulation in 34 cases, femoral vein in 34 cases, Direct superior venacaval (SVC) cannulation in 24 cases, ascending aortic cannulation in 4 cases and SVC cannulation percutaneously in 1 case (Figure 4).

Figure 4: site of cannulation



The maximum number of incision was in the range of 3-4cm in 14 cases. The others are 12 cases in 4-5 cm range, 4 cases in 2-3 cm range and 9 cases more than 5 cm range (Figure 5).

Figure 5: length of incision



Discussion

Minimally invasive cardiac surgery is becoming popular day by day by the introduction of newer technique, tools such as shafted instrument, bendable sternal or rib spreaders, soft tissue retractors as well as thoracoscopy and robot. In Khwaja Yunus Ali medical college, so far we have done 40 cases of minimally invasive cardiac surgery (MICS). Of these, 25 cases were ASD (Secundum), about 64.5% of cases. The study done by Jaurena ASD case was 94.⁶ In the study of Iribarne it was 103(11.3%), mitral valve procedures 507(55.7%), aortic valve procedures 71 (7.8%), CABG 96(10.5%).⁷ In another study of Costa, ASD was 24(84%), Aortic valve replacement (AVR) 32, mitral valve repair 12.⁸ Regarding sex distribution, 25(64.11%) were female and 14(35.89%) were male. In the study of Barbero male were 503(51.8%).⁹ In another study of Costa male was 45(47%) and female 50(53%).⁸ It was 52.6% male and 47.4% female in the study done by Iribarne.⁷ According to age distribution, maximum number of patients (12) was in the range of 11-15 year age group followed by 9 cases each in 16-20 year and 21-30 year age group. In the study of Hua mean age was 47.9±16.8 years, more than 70 years, 78(6.3%) and more than 80 years, 3 cases.¹⁰ In the study of Iribarne, mean age was 57.2±15.1 years, more than 70 years 214 cases and 48 cases who were more than 80 years.⁷ In case of Costa mean age was 55±15 years and in the study done by Barbero, mean age was 62.5.^{8,9} Regarding surgical approaches, we opted right anterolateral thoracotomy in maximum 27(67.50%) cases and left anterolateral thoracotomy in 10 cases (25.00%). In another study of Costa, ministernotomy was 8(8%), right anterolateral thoracotomy 8(8%) and 42 cases in minithoracotomy.⁸ In case of Iribarne minithoracotomy 782(85.9%) cases and partial sternotomy 90(10%) cases.⁷ In another study of Jaurena sub mammary 60 cases, axillary 40, upper ministernotomy 18, and lower ministernotomy 141, video assisted mini thoracotomy 19 cases.⁶ We did 31(75%) cases on pump and 9(25%) cases off pump. Of these 9 cases we did minimally invasive direct coronary artery bypass (MIDCAB). Regarding the site of cannulation; we did maximum number of cannulation in femoral artery (34) cases and femoral vein in same number of cases. Direct superior vena caval cannulation in 24 cases and only a single percutaneous cannulation of superior vena cava (SVC). In the article of Costa femoral artery and femoral vein cannulation was 86 cases ((91%), aorta and femoral vein in 1 cases, femoral artery and vein and internal jugular vein in 3 cases.⁸ The study of Iribarne showed central aortic cannulation 765 cases (84%), femoral artery in 15% cases, venous drainage was most commonly bicaval 765 (84%). Most common venous drainage was percutaneous SVC and percutaneous inferior vena cava (IVC) 446(49%) cases.⁷ The maximum number of incision was in the range of 3-4 cm (35.89%), followed by 4-5 cm in 30.77% cases. In case of Kulkarni mean scar size was 7.23 cm.¹¹ In case of Costa the length of incision was 4-10 cm with a mean±SD 6.34±1.2cm.⁸ Aortic cross clamp time ranged from 18-117 min(mean±SD 96±34min) and total CPB time was 50-180 min(mean±SD 96±34min). In the study of Kulkarni mean cross clamp time was 93.8 min and CPB time was 150.23 min.¹¹ In another study of Iribarne mean aortic cross clamp time was 58.1±44.90 min and mean CPB time was 101.9±66.8min.⁷ Length of stay in the ICU ranged from 12 hours to 13 days(mean 2.8±1.7day) and length of hospital stay was 4-30

days(mean 8.7 ± 4.5 day) in a study of Costa.⁸ But it was 99.1 ± 36.3 hours and 25 ± 5.5 days in a study done by Hua.¹⁰ During our study we found shortage of MICS instruments and latest technical knowhow are the drawbacks of further progress of MICS in our institute.

During MICS, it was seen that it is safe with an excellent post operative outcome. Even though there are some cases of stroke, small rate of conversion to full sternotomy, increased cross clamp and CPB time, there is less ICU stay, less pain, increase patient satisfaction and less cost. So, more and more centers are being established for MICS.

Conclusion

As new technology is coming and patients are anxious about pain, post operative scar, MICS is becoming popular day by day. With the development of surgical skills, newer concepts of thoracoscopic and robotics, it is a new challenge to cardiac surgeons to begin familiar with this procedure. So, we have to move fast to acquire the latest technology and enriched ourselves to cope with the latest situation.

Acknowledgement

We are thankful to all the staff of cardiac surgery for their help and support in carrying out the study.

References

1. Navia JL, Cosgrove DM. Minimally invasive mitral valve operation. *Ann thorac Surg* 1996;62:1542- 1544.
2. Cohn LH, Adams DH, Couper GS. Minimally invasive cardiac valve surgery patient satisfaction while reducing costs of cardiac valve replacement and repair. *Ann Surg* 1997;4:421-428
3. Carpentier A, Loulmet D. Open heart operation under videosurgery and minithoracotomy. First case(Mitral valvoplasty) operated with success.*CR Acad Sci* 111 1996;319: 219-223
4. Falk V, Walther T, Autschbach R. Robot assisted minimally invasive solo mitral valve operation. *J thorac cardiovasc Surg* 1998;115:470-471
5. Carpentier A, Loulmet D, Aupeple. Computer assisted open heart surgery, First case operation with success. *C R Acad Sci* 111 1998;321:437-442
6. Jaurena JMG. Minimally invasive paediatric cardiac surgery is here to stay. *Biomed J Sci& tech Res* 2018;7(1): 5705-5708
7. Iribarne A, Karpenko A, Russo MJ, Ummann T. Eight year experience with minimally invasive cardiothoracic surgery.*World J Surg* 2010;34(4): 611-615
8. Costa F, Winter G, Ferreira ADA, Fernandes TA. Initial experience with minimally invasive cardiac operations. *Rev Bras Cir cardiovasc* 2012; 27(3):383-391.
9. Barbero C, Marchetto G, Ricci D, Stura EC. Steps forward in minimally invasive cardiac surgery; 10 year experience. *Ann Thorac Surg* 2019;108:1822-1829
10. Hua K, Zhao Y, Dong R, Liu T. Minimally Invasive cardiac Surgery in China: Multicenter Experience. *Med Sci Monit* 2018; 24:421-426
11. Kulkarni D, Jain K, Sundeep S, Bhavsar D. An audit of minimally invasive cardiac surgery – An initial Experience of 30 cases at our institute. *JDMS* 2016;15:21-23