The workload, outcome and waiting time of cardiothoracic operations: a single unit study in Sri Lanka

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Abstract

Introduction

Heart disease is the commonest cause of death worldwide. Its surgical treatment is expensive, and resources are limited. Although there is general concern regarding the work of cardiothoracic units in Sri Lanka, there is very little scientific data regarding it. Our objective was to establish the workload, outcome and waiting time of cardiothoracic operations in a single unit in Sri Lanka.

Methods

Prospectively entered data from the clinic register and operation logbooks from August 2010 to March 2020 were reviewed retrospectively and collected on data extraction sheets. The data was entered onto a Microsoft EXCEL database and analyzed using SPSS [Statistical Package for Social Sciences].

Results

In 1100 patients, 759 [69%] were males and 341[31%], females; The mean age was 50.8 years [1 day-77 years]. Coronary artery bypass grafting [CABG] was the commonest operation [573;52.1%].

Others were thoracic operations [207;18.8%], valve operations [160;14.5%], congenital operations [89;7.8%], Extracorporeal Membrane Oxygenation/ECMO [29;2.6%], cardiothoracic trauma [20;1.8%], cardiac tumours [14;1.3%] and aortic operations [6;0.5%]. Urgency categories were elective [855;77.7%], urgent [179;16.3%], emergency [36;3.3%] and salvage [30;2.7%]. The mortality rate for elective surgery was 3.3% and that of CABG, 2.4%. The recent death rate while waiting is 5.7%. The present waiting time for elective operations is 9.4 months and is increasing.

Conclusions

Coronary, thoracic and valvular operations are the commonest operations in this unit. The outcomes of surgery are within accepted international standards. The waiting time is long. This study provides a baseline for future research and audit to prioritize capacity building.

Introduction

Heart disease especially ischaemic heart disease [IHD] is the commonest cause of death worldwide [1]. According to the World Health Organization [WHO], cardiovascular diseases caused 17.9 million deaths globally in 2016 [2]. Given that resources to treat heart disease - especially with operative procedures such as Coronary Artery Bypass Grafting [CABG] are not unlimited - the workload, outcome and state of the waiting lists for cardiothoracic operations are of concern to both the public and medical professionals all over the world [3]. In Sri Lanka too, the escalating number of patients in waiting lists across the cardiothoracic units in the country is a hot topic of discussion in clinical circles as well as the media [4, 5]. Yet, very little scientific data is available regarding the actual state of cardiothoracic surgery in Sri Lanka.

In most developed countries, it is mandatory to submit comprehensive data regarding cardiac operations on standard data extraction forms [6]. These help to assess not only the volume but also the patient-specific risk factors and the risk-adjusted morbidity and mortality. Studies show that benchmarking a unit's results against that of a National registry will improve the outcome and organization of a unit [6]. Some units in Sri Lanka do periodically assess their outcome in terms of quantity [i.e. number of operations] and quality [i.e. morbidity and mortality]. However, there is no common data collection system or a registry for cardiac surgeons to submit such data to, and therefore no means of benchmarking their results against a national registry.

The average cost for a cardiac operation such as a CABG in the private sector is SLR 800 000 – 1000 000. Given the life-saving and pain-relieving nature of such operations, the demand for an early date for heart surgery is obvious. The usual procedure in most institutions is to wait-list patients during the first clinic visit. There is a tendency for patients to register in waiting lists in multiple institutions, in a desperate

attempt to have the operation done at the earliest opportunity, thus distorting any general count that could have gauged the size of the problem nationally. If the chance of an early operation appears bleak, those who can afford may get it done in the private sector or abroad. Some may die while waiting. Others simply change their mind and— for better or for worse –opt for non-surgical management. If these events have not been tracked, any figures, merely giving the numbers of those who have been registered, will overestimate the actual number on the waiting list.

We present the workload, outcome and waiting time for surgery of a single surgeon-led cardiothoracic unit in Sri Lanka.

Methods

Ethical clearance was obtained from the local ethical review committee and permission was obtained from the head of the institution to do this study. No identification details were exposed to anyone other than the investigators.

We retrospectively reviewed the prospectively entered data from August 2010 to March 2020. Information was extracted from the clinic registers, ward admission books, operation logbooks and the audit data of the morbidity and mortality records. All patients who underwent a major surgical procedure by the cardiothoracic surgical team of this unit were included. A single patient was entered only once, even if repeated procedures were done. Minor procedures such as thoracostomies were excluded. Data was gathered on data extraction sheets by the investigators and entered onto a Microsoft EXCEL database. Analysis of waiting time was done using SPSS [Statistical Package for Social Sciences] version 25.

Results

During the period of study, 1100 patients had undergone cardiothoracic operations. Their mean age was 50.8 years [range 1 day to 77 years]. There were 759 [69%] males and 341 [31%] females. Coronary artery bypass grafting [CABG] was the commonest operation [573; 52.1%] followed by thoracic operations [207;18.8%].

The others included valve operations [160; 14.5%], congenital operations [89; 7.8%], Extracorporeal Membrane Oxygenation/ ECMO [29; 2.6%], cardiothoracic trauma [20;1.8%], cardiac tumours [14;1.3%] and aortic operations [6; 0.5%]. The operations were largely elective [855; 77.7 %] while the other categories were urgent [179;16.3%], emergency [36; 3.3%] and salvage [30;2.7%]. The overall mortality, including emergency and salvage procedures, was 5.6 % [62/1100] and with the exclusion of salvage and emergency procedures, it was 3.5% [36/1034]. The mortality

rate of elective operations was 3.3% [27/855]. The index operation, CABG, had a mortality rate of 2.4% [13/531].

There were 94 referrals from many parts of Sri Lanka for ECMO and 32 were performed; the commonest reasons [21%] for not doing ECMO was difficulty in transferring the patient to our centre. All ECMO procedures have been either salvage or emergency procedures on six neonates, five children and 21 adults who have collectively been supported for a total of 5493 ECMO hours. The commonest indication [87.5%] for ECMO was severe respiratory failure ; 2/32 [6.25%] were post cardiotomy ECMO. While the overall ECMO survival was 46.9%, some groups have shown better survival: leptospirosis with pulmonary haemorrhage has had 70% [7/10] survival, and neonatal meconium aspiration has had 100% (3/3) survival–all with no neurological or other sequelae.

Over the last two years, the median waiting time for urgent operations was 37 days and for elective operations, 96.5 days. While there was no change in the trend in waiting times of urgent operations, that of elective operations has increased. The average number of days the patients operated at the beginning of 2020 had waited were: 127 in January, 224 in February and 283 in March [Fig 1]. During these three months, although 35 patients had been scheduled for elective surgery, due to 12 urgent operations, only 14/35 [40%] of elective operations could be done as scheduled. Thus 17/35 [48.6%] were postponed. Furthermore, 2/35 [5.7%] died while waiting for surgery, 1/35 [2.9%] opted for non-surgical management and 1/35 [2.9%] were lost to follow up.

In the year 2019, although 120 theatre session were available, only 84 sessions [70%] were utilized. The reasons for non-utilization were theatre repairs [12; 33.3%], academic sessions [11; 30.6%] public holidays [7; 19.4%] and miscellaneous reasons 6[16.7%]. Although two other fully equipped theatres are available to run parallel sessions, 89/120 [74.1%] sessions did not utilize the second theatre due

Figure 1. Trends in the average waiting time for an elective cardiothoracic operation

to lack of doctors. The third theatre is not utilized due to the lack of a third consultant.

Discussion

There are 23 cardiothoracic and thoracic surgeons for the almost 22 million population of Sri Lanka. They are distributed in 17 institutions: i.e. eight government hospitals, one semi-government hospital and eight private hospitals. Hosain et al compared the patterns of cardiac surgery in Southern Asia in 2016 and found that 5500 cardiac operations had been done in Sri Lanka, amounting to 265 operations/ million population [7].

In comparison to a country such as the USA doing 2160 /million, this may appear inadequate [7]. Nevertheless, Sri Lanka was still the highest performer in Southern Asia, when compared with her neighbours: India [113.3/million], Pakistan 108.8/million, Nepal 69.2/million and Bangladesh 68.6/million population. Bhutan and Maldives had no cardiothoracic programs and had been sending their patients abroad for cardiac operations at the time [7].

International studies have shown that cardiothoracic centres with higher volumes show lower mortality [8]. Centres performing <125 CABG /year are generally considered as low volume centres [8]. A study done in 2017 involving five countries showed the overall mortality rate for CABG to be 3%. [Denmark 2.8, England 2.2, Portugal 2.3, Slovenia 3.5 and Spain 4.9%] [8]. Accordingly, our unit which has performed 73.5/CABG /year over the last couple of years would be considered a low volume centre. Still, our unit's mortality rates for CABG is 2.4 % and is well within acceptable international standards.

A recent study from Ireland quoted 32 days as their waiting time for an urgent cardiac operation [9]. Our average waiting time has been only slightly higher [37 days] with minimal change over the years as the very nature of the disease severity requires urgent attention. It is the elective group that appears to be the problem in the region: In 2005, Thailand reported 27.9 weeks of waiting for paediatric cardiac surgery [10]. In 2009 the National Hospital of Sri Lanka [NHSL] reported 10 months as their average waiting time [11]. Our waiting time in 2020 is 37.5 weeks.

A waiting time of 6-8 weeks has been considered acceptable for elective cardiothoracic operations internationally [12]. Accordingly, the waiting times in the region, including our centre, appear to be unacceptably long.

Prolonged waiting has adverse effects. Teo et al. have shown that it is associated with increased anxiety [13]. Sampalis et al. reported a significant decrease in physical and social functioning for patients waiting for more than 3 months for CABG [14]. Underwood et al. have shown a positive correlation between waiting for time and anxiety, depression and social morbidity— irrespective of the severity of their clinical symptoms [15]. A Canadian study in 2018 found that 0.8% of patients died while waiting for cardiac surgery [16]. In our unit, it is much higher, with currently 5.7% dying while waiting, which underscores the seriousness of the problem.

According to a recent systematic review of strategies to reduce waiting time, the need to use multidimensional strategies that are tailored to the requirements and opportunities presented in each unit was emphasized [6]. The reasons for the delay cited in the study from NHSL was the lack of ICU beds [11]. On the other hand, our study found the lack of doctors to be the main obstacle. Cardiothoracic and ECMO procedures can be technically complex and energy-intensive, and even experienced doctors take time to acquire familiarity with them. Unfortunately, by the time doctors acquire some competence with these procedures, most are due for transfers. Thus, although waiting list initiatives to encourage more operating are in place, lack of experienced junior doctors makes it difficult to utilize such initiative schemes to run parallel theatres safely. Some countries have successfully overcome similar problems by utilizing nurse practitioners as physician assistants, who among other duties, also perform vein harvesting and surgical first assisting [17].

Provision of long-term junior staff in adequate numbers, encouraging more cardiothoracic residents, an in-service training /diploma in cardiothoracic surgery for doctors and creating physician assistant posts are all potential strategies that could utilize theatre time more effectively. In our unit, we have periodically increased our output by inviting an overseas consultant cardiothoracic surgeon to help us utilize the second operating theatre by running parallel theatre sessions that are staggered safely.

Our third theatre could be utilized if newly qualified cardiothoracic surgeons are appointed to the unit. This would be more sensible than allocating them to peripheral stations that do not have cardiothoracic theatres. This study has provided some insight into the data needed by clinicians and administrators to formulate local and national strategies. After implementing these changes, it will be important to reassess their success and to close the audit loop. Waiting time is likely to increase with the COVID 19 pandemic, as surgeons have been forced to drastically reduce operating worldwide.

This is a retrospective study and has several limitations. The records had minimal data on the severity of the disease/ Euro score that could have given the interpretation of outcomes more meaning [18]. Furthermore, the morbidity data during

the waiting and after surgery were not robust enough to be used and had to be ignored. Further prospective studies could address these issues.

Conclusions

This study has established, for the first time, important data about the present state of cardiothoracic surgery in a single unit in Sri Lanka: Coronary [52.1%], thoracic [18.8%] and valvular operations [14.5%] are the commonest operations. The outcomes of surgery are within accepted international standards with a 2.4% mortality rate for isolated CABG operations. The current waiting time for an elective cardiothoracic operation is 9.4 months and is likely to increase. Currently, 5.7% patients die while waiting for their heart operation This study provides a baseline for future research and audit which are essential to generate reliable and accurate data on an important national problem which requires long term solutions.

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