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Insight into The Status of Cardiothoracic and Vascular Surgery Training in Nepal

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ABSTRACT

Cardiothoracic and Vascular Surgery is at a developing stage in Nepal. In Nepal, training of CTV surgeons started in the beginning of the 21st century. Nevertheless, there is already a decrease in trainee's interest in this specialization leading CTVS training to a gasping state at its very neonatal age. Globally, training of medical professionals, in particular CTV surgeons, has been under continuous evolution since its inception. Analogously, in Nepal, the duration of the CTVS training and academic curriculum needs upgrading to meet international standards. Introduction of new concepts, learning advanced diagnostic and therapeutic techniques is important for CTV surgeons in Nepal, to become a competent member of the multidisciplinary Heart Team.

Into the void

Cardiac surgery is a young specialization relative to the other medical specializations. Historically, due to the close relationship of heart with soul, spirit and sentiment, surgeons were reluctant to explore this mysterious organ. Almost a century ago, operating on heart was considered as a journey to an unchartered territory. However, several daring surgeons in history dared to change this concept. Furthermore, after the invention of CPB machine in 1953 by John Gibbon[1], development of the cardiac surgery took a leap in the 20th century.

History of cardiac surgery in Nepal dates back to 1963, when the first closed mitral commissurotomy was performed by Dr D. N. Dangol, a general surgeon, at the Bir Hospital, Kathmandu. First open heart surgery was possible only after 26 years, in 1989, in collaboration with the Australian team led by Dr Alan W Gale at the Bir Hospital, Kathmandu and it was continued by Prof. Damodar Pokharel. After the opening of a dedicated cardiac service at the Shahid Gangalal National Heart center, Kathmandu, in the early 2000, regular cardiac surgeries were performed by the team led by another pioneer in the field, Prof. Bhagawan Koirala. However, formal training of a Cardiothoracic and Vascular (CTV) Surgeon was still a daydream until 2009, when a training program started in the Trivuwan University, Teaching Hospital (TUTH), Institute of Medicine (IOM) and the first MCh (Magister in Chirurgie) resident was enrolled, who has graduated in 2012 becoming first Nepalese trained CTV surgeon. Before this date, the first generation of CTV surgeons were trained and working abroad.

Status Quo

A total of 12,180 adult cardiac surgeons were listed in the CTSNet registry, which translates to 1 adult cardiac surgeon per 0.61 million people globally, or, conversely, 1.64 adult cardiac surgeons per million people. Recent data estimated that high-income countries possess approximately 7.15 adult cardiac surgeons per million population and 9.51 pediatric cardiac surgeons per million pediatric population.[2]

Until 31st December 2023, there were only 25 CTV Surgeons, 7 Cardiac surgeons and one Thoracic surgeon registered in the Nepal Medical council. Out of all registered CTVS surgeons, some are working abroad. Considering the population of Nepal, which is approximately 31 million at the end of May 2024, according to the worldometer, there is less than 1 CTV surgeon for 1 million of the Nepalese population. Furthermore, there is a vast disparity in the distribution of CTV surgeons in the country. Majority of trained CTV surgeons are concentrated in the capital city Kathmandu, leaving only few working in the periphery of the country.

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Cardiovascular diseases (CVDs) are the leading cause of premature death and disease burden globally, disproportionately affecting low and middle-income countries (LMICs).[3] Overall CVDs accounted for 43% of deaths in low income countries (LIC).

Indistinguishably, the burden of cardiovascular disease is increasing in Nepal due to evident epidemiological transition from communicable to non-communicable diseases, change in lifestyle and food habits. At present, cardiovascular disease is the number one killer in Nepal accounting for approximately 27% of death.[4] Additionally, incidence of coronary artery disease is increasing, leading to 17% of total death in Nepal. Recent study reported a prevalence of RHD in 1.66% of school going children screened with Echocardiography in the central part of Nepal.[5] Furthermore, About 1% of children are born with congenital heart defects (CHD) throughout the world, of which 70% require medical or surgical treatment to survive or live in good health before their first birthday. Nevertheless, over 90% of CHD cases in LMICs, much more in Nepal, fail to receive the care they need. Evidently, heart failure due to advanced rheumatic and congenital heart disease are still among the most common cardiac causes of hospital admission in Nepal.[6]

Need of the hour

These cumbersome data emphasize that the need for surgical treatment of cardiovascular disease remains stagnant if not increasing. Zilla et al. estimated a need for 400 cardiac operations per million population per year in low-income countries[7], which translates that there may be a need for about 10000-12000 cardiac surgeries per year in Nepal. However, in a recent study by Rajbanshi et al a total of only 2267 cardiac surgeries have been performed in 2019, majority of them performed in Kathmandu.[8]

Accessibility of cardiac surgery in the periphery of Nepal is limited not only due to lack of specialists in this field but there is a maldistribution of specialized centers. First cardiac surgical center, out of Kathmandu, was established in the College of Medical sciences, Teaching hospital, Bharatpur, where first open heart surgery was performed in December 2014.[9] Successively, other hospitals began to perform sporadic cases in the central and eastern part of the country.[8] Nevertheless, still there is no center performing cardiovascular surgery in the western part of the country.

Challanges in Training CTV Surgeons

At the moment, there are few institutions affiliated to Tribhuvan University, National Academy of Medical Sciences, and Kathmandu University that are running the super specialization program in CTVS, unlike some countries where a specialist board controls the training and licensing process.

In Nepal, training qualified cardiac surgeons presents a significant challenge to the teaching institution due to limited resources and facilities. In line with substantial variation in the cardiac surgical workforce around the globe, specialty training markedly differs from country to country. In some countries, like Nepal, CTV surgeons are trained as one specialist, whereas in other countries Cardiac, Thoracic and Vascular surgery represents separate specialization and training, while few integrate Cardio-thoracic as one specialization, leaving Vascular as an independent specialization. Entry requirements, process and training period can also vary place to place. Nevertheless, even highly developed countries are reviewing and amending their requirements for entry and training curriculum from time to time to keep pace with the fast revolutionizing medical science.

To be specific, these are different, but not only, specialty training pathways leading to CTVS around the world:

- Two or Three years prerequisite for general surgery, then further training for 3 years leading to CTVS, which is implemented in most of the South Asian countries.
- Five years or 6 years program, mainly practiced in USA, Canada, European countries, some universities in Bangladesh, and Pakistan.
- PhD pathway mostly in ex USSR countries, Europe, USA and some South American universities.
- Other fellowship pathways like in the UK, and Australia.

Training program of a CTV surgeon in Nepal is influenced by the Indian training system. In Nepal, after graduation, a doctor has to undergo basic general surgery training for 3 years and then enroll in the CTVS superspecialization training for another three years. All together, the training period consists of 6 years. Additionally, there are long and cumbersome processes to get a place in both arms of training. The training duration and career pathways in the CTVS is very protracted and at times frustrating and depressing. In addition, unemployed or ''underemployed,'' status of some fresh graduates in Nepal created uncertainty among the aspirant medical graduates to choose the specialization. As a result, decreased interest of doctors in choosing this specialization is evident. Unfortunately, at present, almost all CTVS programs in Nepal are at the verge of closure due to lack of interested candidates. For example, in a prestigious institution like TUTH, IOM, the CTVS resident position is unfilled for the previous 3 consecutive years from 2020. This is a worrisome condition, which needs serious evaluation and imperative to recognize the real threat of a desperate potential shortage of trained cardiac surgeons in the near future, if this status quo persists.

One of the major concerns rectified among CTVS surgeons graduating from such pathways (3+3 year) is they are having less time for theoretical enhancement as well as for hands-on training in Cardiothoracic and Vascular Surgery.

Endorsement

Throughout the globe, many countries have reviewed and modified the CTVS training pathway to make the specialization much more attractive, challenging, yielding and competitive.

Lessons can be learned from Brazil, which has shifted from the traditional pathway of 2 years in general surgery followed by three years of cardiovascular surgery, to a direct access program of five years, excluding the prerequisite in general surgery, for completion of residency in cardiovascular surgery.[10] Similarly, since 1994 Canada has separated three different, cardiac, thoracic and vascular specialties and implemented direct entry in an I6 integrated program in cardiac surgery.[11] Recently, Germany has introduced a new 6-year integrated curriculum which is based on acquisition of specific expertise rather than a rigid timeframe. In effect, the training paradigm is one that is competency-based training in Germany and many other countries.[12] Besides, spending 3 years in general surgery and other sub specializations, and gaining experience in these fields, rarely used once practicing CTVS. Probably, it's time for Nepalese training providers, in collaboration with professional society, to adopt newer versions of training pathways to attract more candidates in this specialization.

To achieve the target of producing a trained CTV surgeon, who can equally contribute to the Heart Team, academic institutions have to implement various training options that are most likely to be successful.

Academic program has to be modified with fixed credit hours divided in segments. Specific attention has to be given to allocate certain academic hours (10-20%) to theoretical activities and in-service surgical training. More emphasis should be given to the supervised hands-on training in the operating room (60-70%) and operative technique laboratory with simulation (5-10%).[13]

In a multidisciplinary team, for cardiac surgeons treating high-risk patients in hybrid theater, it is important to be one of the main actors respected for their competence and total mastery of the surgical act, but not seen only as a standby rescue professional. To achieve this goal, it's imperative to rotate residents to core cardiology, including hands-on exposure in cardiac catheterization lab, electrophysiology, echocardiography, interventional radiology, and endovascular surgery to make them competent in this rapidly emerging competitive job market. In a recent survey of Canadian cardiac surgery trainees, 88% of residents expressed the need for more exposure in catheter-based rotations.[14] Moreover, newer challenges are imposed on the training of the contemporary Nepalese CTV surgeons, like learning advanced diagnostic and therapeutic techniques.

Exposure in the echocardiography and Vascular Doppler study is vital for CTV surgeons. CTV

surgeons must be competent enough in pre operative, intraoperative and postoperative implementation of echocardiography and Doppler in cardiovascular patients.

Competency in Multidimensional Cardiac CT, CT angiography and Cardiac MRI can be "feather on the cap" for advance diagnosis of cardiovascular disease. In the last decade, significant changes have occurred which will permanently impact the practice of CTV surgeons and will redefine their role in managing cardiovascular and thoracic patients.

Cardiovascular and thoracic surgery procedures are becoming less invasive, catheter based, from which patients are benefitting, plus patients have high demand and expectation. So, surgeons risk getting left behind unless they develop a new set of skills that will allow them to participate and perform these novel procedures. Heart valve surgeries were supposed to be a major workload for cardiac surgeons around the world. In recent days, indications for valvular surgery are changing more towards endovascular techniques. Modern procedures viz. TAVI, Mitraclip, Transcatheter Mitral and Tricuspid valve replacement are emerging. Open CTVS procedures are still an important way to treat; but proportionately, this is likely to continue decreasing. Recent data from the United States show that the number of TAVI performed has surpassed the number of SAVR during the study period: 2015–2016, 44.9% vs. 2021, 88% in all age groups including young patients.[15] If this trend remains and CTVS surgeons don't embrace new armamentarium into their arsenal, time is not far that CTV surgeons will be jobless. To counter this situation, training programs have to be adopted to provide a more comprehensive training experience in the diagnosis and management of all aspects of cardiovascular diseases through multi-disciplinary training. Proficiency in catheter based treatment like peripheral artery stenting, endovascular stent-grafting for aortic disease (TEVAR, EVAR), and placement of transcatheter aortic valves (TAVI) should become a prerequisite for young CTV surgeons to survive in this competitive field.

Contemporary cardiac surgeons should be skilled in minimal invasive cardiac surgery to offer it whenever indicated. So, exposure to the minimal invasive cardiac surgery should be made compulsory in the training curriculum or encouraged as an additional fellowship at a high volume specialized center. Naturally, younger surgeons who are proficient in the new procedures will have ample workspace.

To encounter the unemployment issue for newly graduates, there is a need of investment in subspecialties with chronic scarcity of surgeons and high demand from patients, such as in the treatment of congenital heart diseases, treatment of advanced heart failure through implantation of circulatory support devices and heart transplantation and the treatment of arrhythmias. Establishing a simulation lab in the department is important. Simulation training for proficiency in endovascular procedures, minimal invasive surgery and other catheter based procedures permits the residents to acquire the technical skills for these complex procedures before doing them independently in the operating room.

Another critical aspect is ensuring adequate exposure to complex procedures. Collaboration with international institutions for visiting faculty programs and trainee observerships would provide invaluable experience. Fresh graduates should maintain the habit of continuously updating through CMEs, workshops, courses and conferences organized by medical societies, industries, and institutions.

CTVS training should be tailored specially to permit for alternative pathways and additional specialty training. Fortunately, Nepal's training as a Cardiothoracic and Vascular Surgeon also allows graduates to practice these three specializations as separate specializations, increasing the possibility of being employed even if one of these specializations, specially cardiac surgery, is not available in a hospital.

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Major hurdle in training a competent cardiac surgeon in Nepal is the shortage of qualified trainers and advanced cardiac care centers throughout the country. The country needs to invest in peripheral centers, faculty development programs, encouraging experienced surgeons to pursue training positions and establishing fellowships to nurture the next generation.

Empowering peripheral centers to perform Cardiothoracic and Vascular surgery on a regular basis is important to create job opportunities for newly graduated CTV surgeons in Nepal. Innovative financing mechanisms are necessary to ensure funding of surgical services on a regional level. Introducing new financial models such as public-private partnerships will permit establishing specialized peripheral centers to perform regular cardiac surgeries, creating more job opportunities. In addition, “Poor Patients Relief " program, social insurance scheme, free treatment for RHD patients, free treatment for kids below 15 years and elderly above 75 years should be made available throughout the country to retain patients in the peripheral hospitals rather referring them to the hospitals in Kathmandu. Finally, fostering a robust research environment is essential. Encouraging research collaborations and participation in international trials will keep Nepali CTV surgeons at the forefront of medical advancements.

By addressing these challenges, Nepal can empower its healthcare system with enough manpower to provide the best possible cardiothoracic and vascular surgery care to its citizens. In summary, through this editorial it is emphasized for a multi-pronged approach to strengthen Cardiothoracic and Vascular Surgery training in Nepal.

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