PERSPECTIVE

Establishing a spine surgery service in a low-resource setting: an experience from Herat, Afghanistan

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Introduction

In this era, surgical care is increasingly recognized as a public health priority with the transition of disease patterns toward chronic and non-communicable. A significant proportion of diseases originated from causes like injuries, malignancies, and musculoskeletal disorders which are often correctable by surgeries. As such, surgical amenable pathology is identified as a major contributor to the global burden of disease [1]. Despite remarkable gains observed in global health within the last two decades, the overall positive development is not observed in low-income and middle-income countries (LMIC) where increased morbidity and mortality from surgically correctable common conditions have been observed [2].

In Afghanistan, there is a growing unmet surgical need owing to an underdeveloped healthcare system resulting from persistent political and economic instability. The scope of health services in Afghanistan is defined by the Basic Package of Health Services (BPHS) and the Essential Package of Hospital Services (EPHS) released by the Afghan Ministry of Public Health [3,4]. Basic and essential surgical care is not included as one of the seven major elements of BPHS [3]. The fragmented and resource-depleted healthcare system is lacking in the specialized surgical workforce and thus is insufficient to cater to the country's needs.

Spine surgery is one of the least developed surgical specialties in Afghanistan due to the lack of local orthopedic surgeons and neurosurgeons. Even though it is relatively new compared to other surgical fields, it is essential to treat a range of diseases, conditions, or deformities involving the spine, spinal cord, and peripheral nerves. These include discopathy, spinal canal stenosis, tumors of the spinal cord, spinal cord meninges, and vertebral spine, infective diseases of the spine, vertebral spine fractures, and congenital diseases of the spine to name a few. Currently, military treatment facilities in Afghanistan provide a substantial amount of civilian care to cover the gap in healthcare needs among the local community. A study by Barbier *et al.* shows that orthopedic surgery constituted almost half of the procedures performed in a Role 3 medical treatment facility in Kabul commanded by France [5]. Another study reports that roughly half of the surgeries performed for local civilians in U.S. military facilities in Afghanistan during more than a decade of war were for non-combat injuries and health problems[6].

A great proportion of patients with spinal conditions are forced to seek treatment from neighboring countries due to the lack of public and privately-funded spine surgery services within the region. These medical trips do not only induce considerable costs including costs for transportation and accommodation but, visas are often required this result in a bureaucratic delay in receiving timely treatment. Other than that, finding and consulting a reliable doctor in a foreign country is also a challenge.

Due to a high unmet need, the first spine surgery center was established in 2018 in Herat, a province in western Afghanistan. Establishing a specialized surgery center and providing quality surgical care is challenging in a resource-depleted setting. In this paper, we share our experience in establishing the center, the challenges we faced, and the ways in which we overcame them.

Setting up the service

Subspecialization in orthopedics and neurosurgery, particularly in spine surgery is not provided in the tertiary education facilities in Afghanistan. The idea of establishing a spine surgery service was started by an orthopedic surgeon who initially completed his medical education and residency in Kabul, Afghanistan. Subsequently, he pursued his further education under a doctorate scholarship at Osaka Metropolitan University, Japan, specializing in orthopedic and spinal surgery. Upon returning to Afghanistan, he focused primarily on initiating a spine surgery service to provide essential surgical treatment to the local community.

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Compared to some other surgery disciplines, the budget required for spine surgery in terms of equipment is relatively higher. This is because spine surgery involves various pathologies and the need to acquire various implant instruments and peripheral equipment. Due to the high rate of interest, lack of government support, and lack of regulation in the country, taking a loan from financial institutions is not a viable option for many of the enterprises in Afghanistan [7]. Private funding was utilized by our team to set up the service. Sufficient loans were successfully obtained from the families of the founding members after much effort.

The day-to-day operation of the service is funded by fees charged to the patients who obtain treatment at our hospital. Most of the patients pay for the treatment out-of-pocket. Out-of-pocket expenditure is the predominant form of health financing and comprises over three-quarters of the total health expenditure in Afghanistan[8].

Infrastructure, equipment, and instrumentation

The fundamental requirements for a basic spine surgery service include an emergency room, examination room, a dedicated ward, preoperative preparation room, operating theatre, and post-operative care room. Instead of building a center from scratch which requires colossal funding and considerable time, our team opted to establish our service in an existing healthcare facility. Jami Hospital was chosen as our base as it is one of the hospitals with the most comprehensive facilities within the region.

Another challenging aspect in establishing the service was the lack of access to surgical equipment essential for spinal surgery in the local setting. The procurement of equipment via hospital administration would require many months as it involves several administrative steps and bureaucracy. To facilitate procurement, our team obtained assistance from personal contacts from other countries who have access to the equipment and selected companies that possess import permits to import surgical equipment to Afghanistan. Other than that, many instruments and equipment were also contributed by colleagues and personal contacts from other countries, especially Japan. Most of the items were supplied from Germany, China, Pakistan, Japan, and the United Arab Emirates. Listed below are the equipment we procured to initiate the service:

- Spine surgery operation table
- Surgical ceiling lights
- Headlight
- Spine frame
- Skull Holder clamp
- Anesthesia machine
- Electrocautery
- Suction
- Cervical Casper retractor
- Lumbar spine Casper retractors
- Discectomy instrument set
- Microdiscectomy instrument set
- Lumbar spine Pedicle screw insertion instrument set
- Cervical spine pedicle screw instrument set
- Posterior lumbar interbody fusion set
- Lumbar spine corpectomy instrument set
- Anterior cervical spine discectomy fusion set
- Spinal cord tumor resection set
- High-speed microdrill
- Sagittal saw
- Spine surgery operation microscope
- C-arm fluoroscopy

Personnel and training

The lack of trained healthcare professionals was another challenge in establishing the service. At the time of writing, our team consists of six surgical doctors, two anesthesiologists, ten nurses (four preoperative care nurses, two OT nurses, two postoperative care nurses, and two scrub nurses), and three housekeepers.

All of the surgical doctors received specialized training outside of Afghanistan and possessed previous experience in the orthopedics and/or neurosurgical field. The lead consultant was trained at Osaka Metropolitan University, Japan for 4.5 years. Two of the doctors completed short-term fellowship training at the Spine Injury Center in Izuka Japan.

Competent nurses are indispensable in the provision of comprehensive and optimal care to patients in every spine surgery treatment phase, from preoperative to postoperative care. The nursing team underwent a strict selection process conducted by the founding members. Successful candidates were then provided with relevant specialized training in their roles. Preoperative nurses were trained in carrying out joint examinations of the patient's condition, preparing patients for operative procedures, standard operating procedures in handling emergency cases, and provision of patient care upon the completion of the operative procedure. Scrub nurses were trained in working and handling instruments and implants under sterile conditions. OT nurses received training in examining patients' general conditions and vital signs, setting up the operating room as well as handling instruments and

implants under sterile conditions. Post-operative nurses received training in providing care, and moving and ambulating patients with spinal cord trauma as well as measures to prevent bedsores and muscle breakdown.

Raising awareness and building trust

It was difficult to gain the trust of the local community during the initial phase as spine surgery is a relatively new field in Afghanistan. Most of the patients were generally more confident to undergo their treatment and surgery in neighboring countries despite the logistical obstacles and financial burden. Our team decided to perform basic and elective procedures like laminotomy and discectomy and target conditions with higher prevalence among the local population during the initial phase of the establishment. For more complex procedures, a collaboration was initiated with the Spine Surgery Department of Osaka Metropolitan University, where the lead consultant obtained his sub-specialization. Treatment options and surgical technicalities were discussed with the overseas counterpart to provide the best possible individualized treatment plan with the resources available.

The types of procedures conducted have been expanding gradually in a selected manner over the past six years along with the increase in trust towards our service among the local population. Consultations and discussions with professors from Osaka Metropolitan University are still being carried out at the time of writing. The range of procedures carried out at Jami Hospital before and after the establishment of the service is presented in Table 1.

Before the Establishment of Spine Surgery Service (Initial phase:2018)	After the Establishment of the Spine Surgery Service (Current:2024)
• Laminectomy and discectomy • Instrumentation for thoracolumbar fractures	• Microscopic discectomy • Minimally invasive spinal decompression surgery • Posterior lumbar interbody fusion • Anterior cervical discectomy fusion • Cervical spine corpectomy and fusion • Cervical spine pedicle and lateral mass screw fixation post fractures • Cervical spine laminoplasty • Lumbar spine corpectomy fusion • Gibus deformity correction surgery • Vertebral kyphoplasty • Spinal cord tumor resection surgery • Posterior fossa decompression surgery • Posterior spine instrumentation post-fracture • Spine needle biopsy • Different kinds of spinal blocks

Table 1: Comparison of services provided at the hospital before and after the establishment of the spine surgery

Achievements and future perspectives

Over the years, the number of operations with favorable outcomes increases steadily. The number of patients from other cities who seek treatment at our center is also rising significantly. Several surgical procedures that were not performed in the western region of Afghanistan previously are now made possible with a local spine surgery team. Since the initiation of the service, more than 2700 surgical procedures with varying pathologies have been carried out. Spinal cord tumor removal, posterior lumbar interbody fusion, anterior cervical spine discectomy and fusion, posterior fossa decompression surgery, cervical spine laminoplasty, deformities correction surgery, and balloon kyphoplasty were performed for the first time in the region at our center.

Our team aims to provide a standardized and high-quality evidence-based spine surgery service. With our aspiration to expand the service, we aim to create more employment opportunities for local healthcare workers and act as a spine surgery training center. It is of paramount importance that the younger generation of aspiring healthcare professionals have access to specialized knowledge to ensure the provision of a sustainable service.

The exchage of professional knowledge conducted between our center and institutions abroad has played an important role in the success of the service thus far. It highlights the importance of collaboration with institutions from other developed countries when working under tight financial budgets with a lack of trained healthcare professionals. Our team hopes to initiate more collaborations with various agencies and organizations shortly to optimize the service provided. International collaboration could also be a gateway for the continuation of the education of our existing staff.

The development of a comprehensive spine rehabilitation service is eminent to optimize the utilization the limited surgical resources and maximize patients' long-term outcomes especially in the realm of spine surgery. Our team aspires to develop a comprehensive and cost-effective rehabilitation program to support postoperative recovery and community reintegration of patients. This is particularly important in a country like Afghanistan where over one-third of the population lives below the poverty line[8].

Conclusion

Although diseases and conditions related to the spine can affect the quality of life of afflicted patients immensely, spine

surgery field has been under the radar of the Afghan government and other private and international organizations. Establishing and maintaining a sustainable spine surgery service in a resource-depleted setting is undeniably challenging but also rewarding. Setting up a spine surgery service in western Afghanistan is undoubtedly a notable achievement and marks the beginning of specialized and individualized surgical treatment within the region. Nevertheless, there are several potential areas for development and improvement to bridge the knowledge gap and to provide high-quality evidence-based service.

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