

ORIGINAL ARTICLE

Trend and Profile of Spine Procedure in Rural Area: Four years' Experience from A Single Tertiary Hospital in Klaten Regency, Indonesia

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ABSTRACT

Introduction: In Indonesia, spine procedure including surgery was increasing in the current years. However, there was a lack of data about it in Indonesia as a developing country. We collected and described all of spine procedure that had been done in a single center in Klaten regency as a representative of the facilities at rural area in developing settings. **Method:** This is a retrospective study including all patients who were undergoing spine procedure in the Department of Neurosurgery Dr Soeradji Tirtonegoro Central Public hospital of Klaten during the period of study from January 2019 to December 2022. The number of spine procedures was recorded and plotted in a pie chart and bar diagram. The data consisting pathology of the spine, spinal level affected, and type of procedure were obtained from medical records. **Result:** In the last four years, out of 210 cases in total, there was an increasing pattern of spine procedure with degenerative condition being the most common pathology of our cases. Lumbar region is the highly affected level of spine and our procedures mainly consisted of spine instrumentation. **Conclusion:** Even a rural area in developing country has a huge potency to develop advanced spine procedures.

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years to clarify the characteristics and recent trends for improved planning of future directions of spine surgery.

INTRODUCTION

Spine conditions are common and the surgery is evolving even in developed economies (1). Global estimates suggest that close to 313 million surgeries are performed annually with approximately 500,000 lumbar spine surgeries each year in the United State (2,3). Otherwise, to the best of our knowledge, there are few comprehensive reports in developing country especially in Indonesia. Spine surgery in Indonesia has changed rapidly over the last ten years, with many centers offering spine surgery particularly in a tertiary hospital (4,5). Dr Soeradji Tirtonegoro Central Public Hospital (RSST) is one of tertiary hospitals in Klaten regency, a rural area in Central Java with 1.2 million population per 2020 and 655 km² cover area, with more than 450 hospital beds (6). Therefore, this study aimed to review its advance spine procedure, particularly from a low-income country with limited resource, represented by RSST, including surgeries and pain intervention over four

MATERIALS AND METHODS

The subjects were patients who underwent spine procedure at RSST by WB (the author of this article is board-certified neurosurgeon and certified spine fellowship who started working in the late 2018 to the present) over four years from January 1st, 2019 to December 31st, 2022. A retrospective analysis was performed using data extracted from the RSST Registry: sex, age, diagnosis, types of operation, and materials used. The study protocol was approved by the Committee on Ethics in Human Research at our hospital. This study was approved by Committee on Ethics in Human Research, Dr Soeradji Tirtonegoro Central Public Hospital, Klaten, Indonesia (Ethical Number DP.04.03/D.XXVI/23722/2023).

RESULTS

A total of 210 spine procedures were performed over the period. These 210 cases included 124 males and

86 females (Table I) The ages of the patients range from nine to seventy-seven years old (average 52.1 years old: D 11.5) (Table I) Most patients (38%) who underwent spine procedures were those in range of 51 to 60 years old (Table 1.) There was an increasing pattern of spine procedure recorded year by year from 2019 with 33 to 46 procedures in 2020, then 50 procedures in 2021 and 78 in 2022 (Fig. 1).

In Presenting Pathology, degenerative conditions are

Table I: Cases characteristic demography

Variable	n (%)	Mean $\pm$ SD
Sex		
Male	124 (59)	
Female	86 (41)	
Age (year)		
≤ 20 y.o	2 (1)	52.1 $\pm$ 11.5
21-30 y.o	6 (3)	
31-40 y.o	31 (15)	
41-50 y.o	42 (20)	
51-60 y.o	80 (38)	
61-70 y.o	45 (21)	
≥ 71 y.o	4 (2)	

SD: Standard deviation; n: frequency; y.o: years old

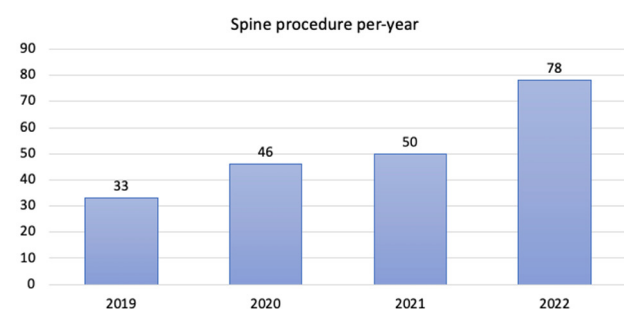


Figure 1: Spine procedure number year by year in Dr Soeradji Tirtonegoro Central Public Hospital, Klaten regency, Indonesia between 2019 to 2022.

the most prevalent pathologies accounted for 148 cases (71%) followed by tumor and trauma with 14% and 10% proportion, respectively, then infection for 3% of all cases (Fig. 2). Level of spine affected revealed the lumbar region was the most commonly operated region with 107 cases (51%), followed by the cervical region (Fig. 3). Instrumentation surgeries were dominant with 44% proportion of all procedures, followed by non-instrumentation and pain intervention procedures (Fig. 4).

DISCUSSION

The development of a spine surgery service in a low-resource setting must be considered in light of the nation's overall health care system (7). The trend in spinal surgery has improved rapidly and consistently in developing countries such as West Africa and Asia over

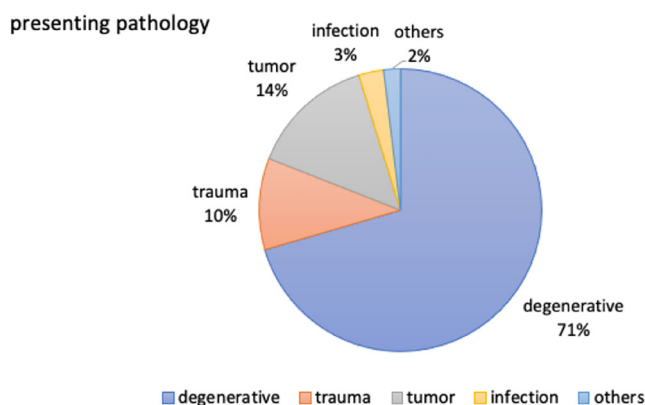


Figure 2: Presenting pathology of all spine procedures in Dr Soeradji Tirtonegoro Central public Hospital, Klaten Regency, Indonesia between 2019 to 2022

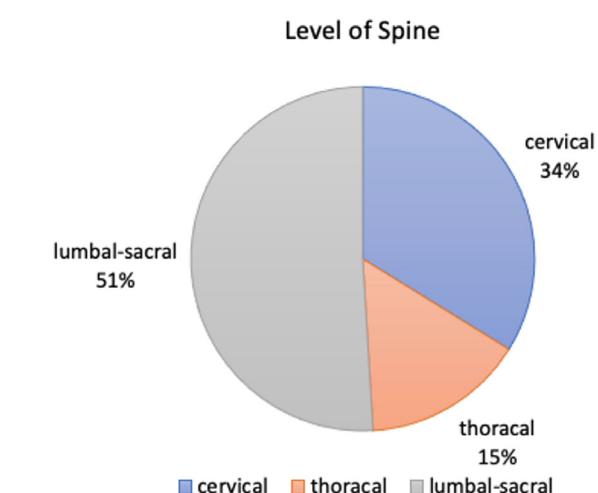


Figure 3: Level of spine of all spine procedures in Dr Soeradji Tirtonegoro Central public Hospital, Klaten Regency, Indonesia between 2019 to 2022.

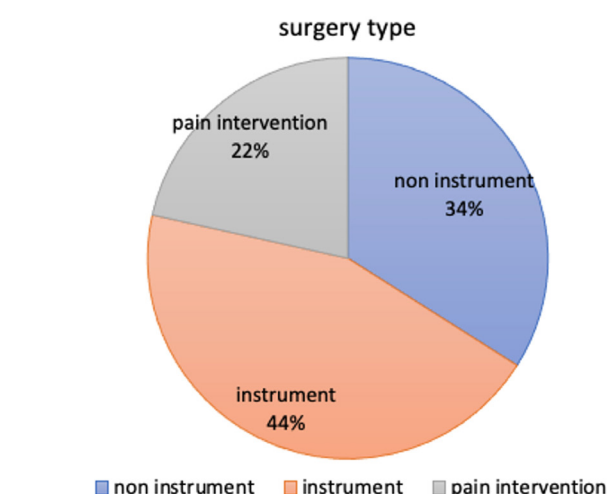


Figure 4: Surgery type of all spine procedures in Dr Soeradji Tirtonegoro Central public Hospital, Klaten Regency, Indonesia between 2019 to 2022.

the ten years of the study and is related to increasing expertise, more available facilities, and implant availability (8,9).

Indonesia, as a lower-middle income country, with the fourth biggest population in the world and relatively large geographic area, is still struggling to reach ideal health care system, including ones related to spine surgery (10). RSST may represent as one of rural health care facilities covering a huge population, with only two practicing neurosurgeons there recently. In this study, we collected and analyzed the basic data of spine procedure within the last four years since one of the neurosurgeons here started spine procedure in this single hospital and “low resource” setting.

A total of 210 patients underwent spine procedures, with at least one spine procedure done every week on average. These 210 patients included 59% males and 41% females, typically in their early 50s. This finding is not in concordance with the previous study in Japan, that the most frequent age to undergo spinal surgery, in general, was among patients aged over 70 years old (11). In Japan, spinal surgery in the elderly has been facilitated by improved surgical techniques and better anesthesia (1). Minimally invasive surgery (MIS), the use of percutaneous pedicle screws (PPS), imaging and intraoperative navigation methods have also become more common there (1).

This study showed that, there is an increasing trend of about two times higher within the first year to the fourth year. Degenerative condition is dominant in more than 70% of all cases, similar to the epidemiology of spine disease in the literature (12,13). However, the number of trauma cases (10%) seems lower than expected based on epidemiology. The lumbar region is also the most commonly affected, with more than half of cases, followed by cervical and thoracic. This data showed that the pattern of spine procedure in RSST is similar to the global epidemiology of spine disease.

Trends in treatment modalities of the procedure seem to be more advanced since 44% of spine procedure include operations using instrumentation implant. The use of pedicle screws could be attributed to improved expertise, availability of implants, and increased awareness among patients. Pain intervention procedure is also quite high in number, with 45 cases compared to the total of 210 cases; it indicated that there was good availability of all procedure in RSST. We are currently developing more microscopic and endoscopic surgery to achieve minimal invasive and more efficient surgery.

In fact, the lack of comprehensive data about spine surgery, especially in Indonesia, has been the biggest obstacle to us in the context of ideal research and development of spine disease health care, in addition to the requisite equipment for spine procedure.

Nevertheless, we have started collecting the data of our center first to make a benchmark in accordance with our interest in building a better health care system, particularly the spine care center. Cost implications, lack of trained personnel, and basic equipment were some of the factors imposing significant challenges to spine care. Wistfully, our data is far from ideal, especially ones that are related to demographic and follow-up data. In the future, our center has special consideration to build surveillance system starting from a sustainable outpatient clinic and so forth.

CONCLUSION

In conclusion, we reviewed spine surgeries and procedures over four years in a longitudinal study. There were clear tendencies towards a rise in surgical procedures, particularly for degenerative diseases. It is expected that new surgical techniques and procedures will be developed, and that the use of instrumentation will continue to rise. This heavier burden on spine surgeons and the changing environment around spine surgery will make the role of training more surgeons with advanced expertise and skills increasingly important, approaching the standards of practice in more developed countries. There is a need for a huge effort to make these services more available, accessible, and affordable to all people.

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