PREDICTING THE DIFFICULTY SCORE OF SPINAL ANAESTHESIA

ABSTRACT

Background: Spinal anaesthesia is the commonest regional anaesthesia conducted for several surgical procedures.

Objectives: This study aims to predict the difficulty score of spinal anaesthesia to scale back the complications and ultimately improve anaesthesia quality.

Materials and methods: Patients undergoing various surgeries involving spinal anaesthesia were taken in this study and several parameters like demographic details, body mass index, spinous process condition were recorded pre operatively to see how they influenced the difficulty of performing spinal anesthesia on them**.**

Results: Out of the 101 patients enrolled in this study, 53 underwent an easy SA by the first attempt in the first space. It was moderate in 36 and difficult in 12 patients.

Conclusion: Considering the examination of patients with respect to BMI, lumbar spinous process status and deformities, radiological signs of lumbar vertebrae can be helpful in predicting how difficult the SA procedure is going to be**.**

Keywords: spinal anaesthesia, severity score

INTRODUCTION

Spinal anaesthesia (SA) is a type of neuraxial regional anaesthesia that involves injection of a local anaesthetic into the subarachnoid space. It is mostly preferred for surgeries of the lower extremity, lower abdomen and urogynaecological surgeries**.**(1)Pre operative prediction of the potential difficulties that may arise during administration of spinal anaesthesia is very helpful in reducing the incidence of multiple attempts. This makes the procedure less risky and more acceptable to the patient as multiple attempts at needle placement may cause anxiety and discomfort to the patient. It is also associated with an increased incidence of spinal hematoma(2), damage to neural structures (3)and post-dural puncture headache(4). Moreover, conditions like kyphoscoliosis, ankylosis spondylitis, osteoarthritis can cause problems in needle access.

OBJECTIVES

This is a study designed to predict the factors that may contribute to difficulty in spinal anaesthesia thereby increasing the quality of this procedure and scale back the complications. To determine the predictive performance of the difficulty variables and to develop a score to predict the difficulty during performance of spinal anaesthesia.

MATERIALS AND METHODS

This is a prospective study approved by the hospital research ethics committee and consent from the patients were obtained. The sample size is 101 patients, The study population included patients undergoing various procedures including emergency and elective lower segment Caesarean section, below knee amputation, hernioplasty, appendicectomy, haemorrhoidectomy, laparoscopic sterilisation, fistulectomy, partial penectomy, total abdominal hysterectomy, cervical polypectomy, fractional curettage.
Exclusion criteria: contraindications to spinal anaesthesia, patients with neurological disease, coagulopathy, infection at site of injection, patients refusing spinal anaesthesia and patients unwilling to participate in the study.
Preoperative routine laboratory and radiographic investigations were done. Before the procedure, patients' age, gender, height, body mass index (BMI), history of previous difficult spinal anaesthesia, history of

surgery of lumbar spine and anatomy of spinous process were obtained. The anatomy of spinous process was divided into 3 groups: visible, invisible but palpable, invisible and impalpable. Patients underwent SA in the sitting position by an anaesthesiologist with more than ten years experience.
Information of cerebrospinal fluid visibility in the first attempt was taken as easy SA. The number of trying times with redirection in the first space or trying in the second space was moderate SA. Redirection in second space or trying in third space is difficult SA. More than three consecutive attempts or usage of extra analgesic drugs or conversion to other types of anaesthesia was considered SA failure.

RESULTS

In the current study,101 patients were taken of which 47 were males and 54 were females. They were divided into four groups based BMI. The other demographic details are presented in table 1. Three patients had history of spinal surgery and 15 had difficult spinal anaesthesia in the past.

Table 1.Demographic Profile of theStudy Subjects

Variables	Results
Gender (P value = 0.07)	
Male	47
Female	54
Age, y (P value = 0.48)	
15-40	61
41-60	35
>60	5
Height, cm (P value = 0.138)	
<165	55
>165	46
BMI, kg/m^2 (P value = 0.01)	
<20	10
20-25	29
26-30	40
>30	22
TOTAL	101

SA was easy and successful in the first attempt in 53 patients, moderate in 36 and difficult in 12.

Table 2. Difficulty of spinal anesthesia in patients

Grading	Results
Easy	
First attempt	53
Moderate	
First space with redirection	20
Attempt in second space	16
Difficult	
Redirection in second space	7
Attempt in third space	3
Incomplete anesthesia and need to other analgesic agents	2
Failure to complete block	0
Total	101

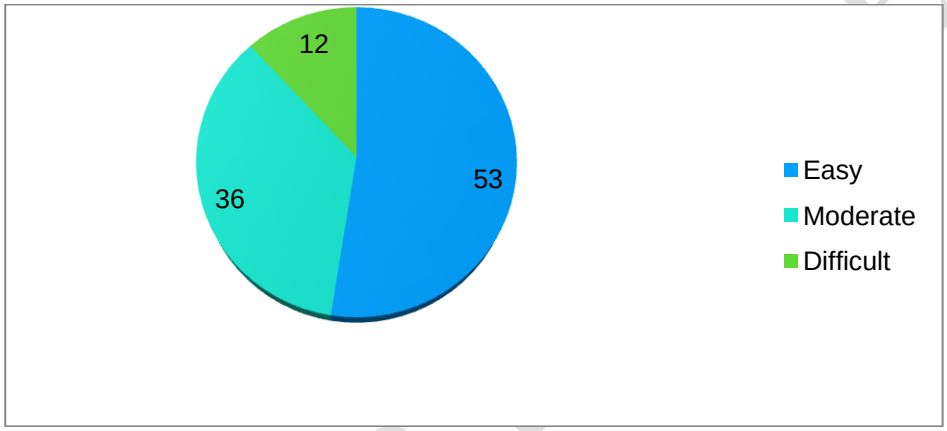
Table 3. Difficulty of spinal anesthesia in different spinal process conditions

	Easy	Moderate	Difficult	Total	P value
Visible	30	12	1	43	0.01
Palpable	22	18	2	42	
Invisible and impalpable	1	6	9	16	
Total	53	36	12	101	

Table 4. Distribution of spinal anesthesia difficulty by Body Mass Index (BMI) levels

BMI, kg/m²	Easy	Moderate	Difficult	Total	P value
<20	5	4	1	10	0.01
20-25	18	9	2	29	
26-30	25	13	2	40	
>30	5	7	10	22	

Fig 1: Number of patients with varying levels of difficulty of spinal anaesthesia



DISCUSSION

The study showed a significant correlation between BMI, spinal deformity, condition of spinous process and the outcome of the spinal anaesthesia.

The history of previous spinal surgery did not seem to affect the difficulty score of the current SA but only 3 patients in our study had a past history of spinal surgery so it's effects on SA may not significantly interpretable in our current study.

There was an increased difficulty score of SA with increase in BMI(5).Ten patients with BMI more than 30, bordering upon obesity had difficult SA as opposed to only 1 patient in the group with BMI less than 20.

In the pre operative work up, 30 out of the 43 patients with visible lumbar spine had easy SA and only 1 patient out of 16 with invisible and impalpable lumbar spine had an easy SA. Hence, there is a significant correlation between the spinous process condition and difficulty of SA.

In a British study on 300 patients, it showed that spinal process condition and radiological signs are the key predictors of difficulty of spinal anaesthesia(6). The experience of the anaesthesiologist had no impact on the severity(7).

In another study on pregnant patients it was found that the practitioner's skill was the most significant predictor(8). In our study, 17 pregnant patients were included most of whom were planned for elective lower segment caesarean section (LSCS). Few patients also had to undergo an emergency LSCS. It was difficult to carry out the procedure in pregnant patients compared to non pregnant ones probably pointing to the fact that a highly skilled practitioner might find it easier to perform the SA owing to his experience.

A study concluded that anatomic features of spine had the maximum impact on spinal severity. Body habitus influenced the number of attempts for spinal puncture. In our study, gender and height had no effect on the severity(9)**.**

An Indian study concluded that there would be need of introducer for spinal needle when there's ligament calcifications(10). In the current study, radiological features were not included deliberately. Radiological spinal imaging is not required in all cases but if the patient happens to have one it is valuable in predicting the score. In another study it was stated that patients with kyphoscoliosis had more failure rates and incomplete anaesthesia(11).

Developing a scoring system as such can help the anaesthesiologist to predict how difficult the SA is going to be and to choose the best technique to suit the patient's condition. It is also useful in emergency cases like caesarean section and in preventing side effects of the procedure.

CONCLUSION

By the end of our study, the conclusion can be drawn that a patient's physical examination especially focusing on their BMI, status of their lumbar spinous process and skeletal spinal deformity can help decide whom to select or not select for spinal anesthesia and which patients are more prone to develop discomfort and side effects of this procedure.

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