

TMSS Medical College Journal (TMCJ)

Volume 19, No. 02, July 2022

Contents

Editorial

- Why BRCA Mutation Testing for Breast Cancer? 5-6
Dr. DM Arifur Rahman, Prof. Moudud Hossain Alamgir

Original Article

- Evaluation of Serum Interleukin-6 Level among Moderate, Severe and Critical COVID-19 Patients Admitted in a Tertiary Care Hospital 7-12
Dr. Nazmus Subha, Dr. Md. Moynul Haque, Dr. Shantanu Das, Dr. Azima Aktar Jhuma
- Correlation of Handgrip Strength and Body Mass Index of Adult Healthy Females of the Slum Area in Dhaka City 13-18
Dr. Mst. Taslima Akter, Dr. Ahsan Arif, Dr. Maskura Benzir, Dr. Rowshon Ara Naznin
- Axial Length of Eyeball in Emmetropic Eye –A study in Rajshahi Medical College Hospital. 19-22
Dr. Maskura Benzir, Dr. Afroj Zahan, Dr. Rashed Mustafa, Dr. Afsana Khanam, Dr. Sabrina Sabnam Ferdous
- Landmark of Sacral Hiatus and its Clinical Significance in Caudal Epidural Block 23-27
Dr. Rawshon Ara Naznin, Dr. Jesmin Sultana, Dr. Mahmuda Sultana, Dr. Musfiqa Aman, Dr. Taslima Akter,
- Comparative Study between General Anesthesia and Spinal Sub-Arachnoid Block for Cholecystectomy in a District Level Hospital of Bangladesh. 29-34
Dr. Md. Muktar Hossain, Dr. Md. Eskender Hossain, Dr. Md. Saiful Islam, Dr. Md. Mir Sufian
- Clinical Profile of Patients with Osteoarthritis of the Knee in a Tertiary Care Hospital in Bogura 35-38
Dr. Ferdousur Rahman Al-Mahmud, Dr. Muhammad Alamgir Mandal



An Official Publication of TMSS Medical College



TMSS Medical College Journal (TMCJ)

July 2022

An Official Publication
of
TMSS Medical College, Bogura, Bangladesh

TMSS Medical College Journal (TMCJ)

Vol. 19, No. 2, July 2022

An Official Publication of TMSS Medical College, Bogura, Bangladesh

Editorial Board

Chairperson : Prof. Dr. Md. Shahjahan Ali Sarker
Editor-in-Chief : Prof. Dr. A.K.M Ahsan Habib
Associate Editor : Dr. Md. Abdul Mazid
Advisory Editor : Prof. Dr. Moudud Hossain Alamgir
Managing Editor : Dr. Md. Matiur Rahman

Members

Brig Gen Dr. Md. Jamilur Rahaman (Retd)
Prof. Dr. Md. Anup Rahman Chowdhury
Prof. Dr. Md. Zakir Hossain
Prof. Dr. Md. Shahjahan Ali
Prof. Dr. Md. Akram Hossain
Prof. Dr. Md. Kamrul Ahsan
Professor Dr. Hafiza Arzuman
Prof. Dr. Md. Azfarul Habib
Prof. Dr. Md. Rafiqul Islam
Prof. Dr. Md. Rezaul Islam
Prof. Dr. Nur-A-Farhana Islam
Prof. Dr. Md. Sheik Abdul Muktad
Dr. Md. Amirul Islam

Advisory Board

Prof. Dr. Hosne-Ara Begum
Prof. Dr. M. Afzal Hossain
Prof. Dr. A.K.M. Ahsan Habib
Prof. Dr. Md. Rezaul Alam
Prof. Dr. Jawadul Haque
Shahzadi Begum

The TMSS Medical College Journal (TMCJ) is published two times a year (January and July). The TMSS Medical College Journal (TMCJ) is approved by Bangladesh Medical & Dental Council (BM&DC/4-D-2016/1478: Dated 15.01.2017). It accepts original articles, review articles and case reports. While every effort is always made by the Editorial Board and the members of the Journal Committee to avoid inaccurate or misleading information appearing in the TMSS Medical College Journal, information within the individual article are the responsibility of its author(s). The TMSS Medical College Journal, its Editorial Board and Journal Committee accept no liability whatsoever for the consequences of any such inaccurate and misleading information, opinion or statement.

Printed by

TMSS Printing Press
Bogura, Bangladesh
e-mail: tmssprintingpress@gmail.com

Address of Correspondence

Executive Editor, TMSS Medical College Journal, TMSS Medical College
Rangpur Road, Thengamara, Bogura, Bangladesh.
Phone: 051-61830, Fax : 051-61830
e-mail: editortmcjournal@gmail.com, Web: www.tmssmedicalcollege.com

*Original Article***Landmark of Sacral Hiatus and its Clinical Significance in Caudal Epidural Block**Naznin RA^{1*}, Sultana J², Sultana M³, Aman M⁴, Benzir M⁵, Akter T⁶

1. Dr. Rawshon Ara Naznin, Assistant Professor, Department of Anatomy, TMSS Medical College, Bogura.
2. Dr. Jesmin Sultana, Associate Professor (cc), Department of Anatomy, Shaheed Ziaur Rahman Medical College, Bogura.
3. Dr. Mahmuda Sultana, Associate Professor, Department of Anatomy, Parkview Medical College, Sylhet.
4. Dr. Musfiqa Aman, Assistant Professor, Department of Periodontology and Oral pathology, TMSS Medical College, Bogura.
5. Dr. Taslima Akter, Assistant Professor, Department of Anatomy, TMSS Medical College, Bogura.

Corresponding Author*Abstract**

Background: Anatomy of sacral hiatus has clinical importance during caudal epidural block. Single bony landmark may not help in locating sacral hiatus because of anatomical variation. This study determines the landmarks for CEB (Caudal epidural block) along with the apex of sacral hiatus and equilateral triangle, were measured. So, the knowledge of anatomy of sacral hiatus is significant while administration of caudal epidural anesthesia and it may help to improve its success rate.

Materials and Methods: This study was performed on 57 out of 60 dry adult human sacra of unknown sexes from the stocks of Anatomy laboratory of Sylhet MAG Osmani Medical College, Sylhet from July 2017 to June 2018. Sex determination of the collected unknown sacra was done by using discriminant function analysis and found 28(49.12%) male and 29(50.88%) female using digital slide calipers and measuring tape different parameters were measured. **Results:** Right and left superolateral sacral crests of the sacrum were taken as two points on dorsal surface of sacrum (forming the base of a triangle) because posterior superior iliac spines impose on the superolateral sacral crests. The distance between the two superolateral sacral crests (base of a triangle) were 60.13mm (range 57-70 mm), the distance between the right Superolateral sacral Crest and the apex were 76.11 mm (range, 56-94mm), the distance between the left Superolateral sacral Crest and the apex 78.53 mm (range, 56-102mm) respectively. Students t'test was applied to reach the level of significance where necessary. A probability value (p) of less than 0.05 was considered statistically significant.

Conclusion: The apex of sacral hiatus and equilateral triangle that is located between the apex of sacral hiatus and superolateral sacral crests was found. That will certainly be use in determining the location of the sacral hiatus during CEB.

Keywords: CEB (Caudal epidural block); Sacrum, Sacral apex, Sacral hiatus.

Introduction

For analgesia and anesthesia in various clinical procedures, we need caudal epidural block which involves injection of a drug into the epidural space through the sacral hiatus. The sacral hiatus is an arched defect in the posterior wall of the sacral canal formed by the failure in fusion of the laminae of the fifth (and sometimes fourth) sacral vertebra dorsally. The remnants of the inferior articular processes of the fifth sacral vertebra elongate downward on both sides of the hiatus, extending from its apex as the sacral cornua¹. Sacral cornua felt at the upper end of natal cleft 5 cm above the tip of the coccyx². The dural sac and

subarachnoid space usually extends to the level of the S2 segment of the sacrum but the dural sac may ends as high as the L5 or to S3. Entry into sacral canal should be safe to prevent dural sac puncture and protect surrounding structures.^{3, 4} The sacral hiatus and the cornua are palpable landmarks employed in caudal epidural injections.^{5, 6} But in case of obese and adults it is sometimes difficult to determine the anatomical location of the sacral hiatus and the caudal epidural space⁷. Incorrect needle placement has been reported to occur in up to 36% of cases, even with experienced operators.⁸ The success rate of CEB is based on

determination of the landmarks by the clinician. The main goal of this study was to identify additional anatomical landmarks in cases where the sacral cornua could not be identified and measurements that may enhance the location of the apex of the sacral hiatus in practical solution for CEB. Measurements on dry sacral bones determine anatomical landmarks that may be used during CEB procedures.

Materials and Methods

This study was performed on 57 out of 60 dry adult human sacra of unknown sexes from the stocks of Anatomy laboratory of Sylhet MAG Osmani Medical College, Sylhet from July 2017 to June 2018. Sex determination of the collected unknown sacra was done by using discriminant function analysis and found 28 (49.12%) male and 29 (50.88%) female. Ethical clearance was taken from the Ethical Board of Sylhet MAG Osmani Medical College, Sylhet. By using digital slide calipers and measuring tape different parameters were measured. Morphometric measurements relating to the sacral hiatus, were obtained such as superolateral sacral crests of the sacrum were used as landmarks in the measurements as the posterior superior iliac spines, which are readily palpable on the body surface of a patient. As the dural sac terminates around the level of S2, the distances from the apex and base of the sacral hiatus to the level of the S2 foramina were also measured.

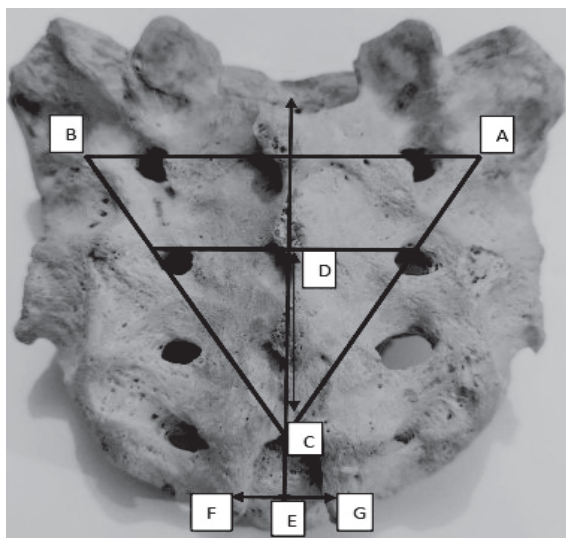


Fig-1: Morphometric measurements of sacrum

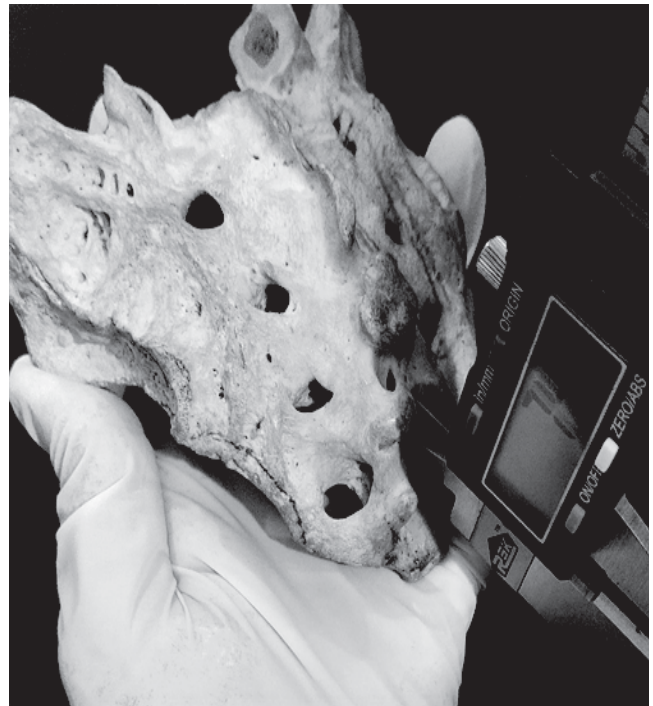


Fig-1: Morphometric measurements of sacrum

So, the morphometric measurements are 1. Length of sacral hiatus (CE); 2. Anterior-posterior diameter of sacral hiatus at the apex; 3. Location of Apex of the Sacral Hiatus; 4. Location of Base of the Sacral Hiatus; 5. Distance between Right Superolateral Crest and Apex of Sacral Hiatus (AC); 6. Distance between Left Superolateral Crest and Apex of Sacral Hiatus (BC); 7. Distance between two superolateral crests (AB); 8. Transverse diameter (width) of sacral hiatus at the level of base or intercornual distance (FG); 9. Distance between apex to level of S2 foramina (CD) and base to level of S2 foramina (ED). Data were processed manually and analyzed with the help of SPSS (Statistical package for social sciences) Version 22.0. Quantitative data were expressed as mean and standard deviation; whereas qualitative data were expressed as frequency and percentage. Students't' test was applied to reach the level of significance where necessary. A probability value (p) of less than 0.05 was considered statistically significant.

Results

Table-I: Length, anterior-posterior diameter at the apex of sacral hiatus (n=57)

Sex	Length of sacral hiatus Mean±SD	Anterior-posterior diameter of sacral hiatus at the apex Mean±SD
Male& Female	25.68±8.35 (13-49)	5.24±1.94 (0.3-10.4)
P value	P<0.001	P<0.001

The mean length of sacral hiatus found 25.68 mm and anterior-posterior diameter of sacral hiatus at the apex found 5.24 mm. So, the measurement of length of sacral hiatus and anterior-posterior diameter of sacral hiatus at the apex was statistically significant (P<0.001).

Table -II: Location of Apex of the Sacral Hiatus Different Level (n=57)

Sl. No	Length of Sacral Hiatus (mm)	n	Percentage (%)
01	0-10	8	14.04
02	10-20	28	49.12
03	20-30	14	24.56
04	30-40	5	8.77
05	40-50	2	3.51
Total		57	100

Length was measured from the middle of apex to the middle of base of sacral hiatus and maximum (49.12%) cases it was between (10-20) mm.

Table -IV: Location of Base of the Sacral Hiatus at Different Levels (n=57)

Sl. No	Level of Base	n	Percentage (%)
01	Coccyx	09	15.79
02	5th Sacral Vertebra	48	84.21
03	4th Sacral Vertebra	-	-
Total		57	100

Location of Base of the sacral hiatus was maximum at the level of 5th Sacral Vertebra (84.21%) and there was a remarkable location of base of sacral hiatus at the level of Coccyx (15.79%).

Table -V: Distance between Right & Left Superolateral Crest and Apex of Sacral Hiatus (n=57) and distance between two Superolateral sacral Crest (n=57)

Measurement Parameter (mm)	Mean±SD	Median	Maximum	Minimum
Right superolateral sacral crest and sacral hiatus apex	76.11±15.6	86.33	94.33	56.00
Left superolateral sacral crest and sacral hiatus apex	78.53±13.95	79.01	102.00	56.00
Distance between two superolateral crests	60.13±2.99	59.68	70.30	57.00

The distance between the right Superolateral sacral Crest and the apex was 76.11 mm (range 56-94 mm) the distance between the left Superolateral sacral Crest and the apex was 78.53 mm (range 56-102 mm). The average distance between the two superolateral sacral crests (the base of the triangle) was 60.13 mm (range 57-70 mm).

Table -VI: Transverse diameter (width) at the level of cornua (n=57)

Transverse width in (mm)	Number	Percentage (%)	Mean±SD (mm)
0-5	2	3.51	12.54±3.96
6-10	19	33.33	
11-15	22	38.60	
>16	14	24.56	
Total	57	100	

The transverse diameter (width) at the level of base of sacral hiatus 12.54 mm. In 38.60% sacra it was 11-15 mm and in 33.33% sacra it was 6-10 mm.

Table -VII: Distance between apex to level of S2 foramina and base to level S2 foramina (n=57)

Measurement Parameter (mm)	Mean±SD	Median	Maximum	Minimum
Apex to S2 foramina	30.27±9.15	28.95	42.87	17.35
Base to S2 foramina	54.01±2.66	53.56	59.68	50.29

Average distance between sacral apex to level of S2 foramina was 30.27 mm (range 17-43 mm) and distance between sacral base to level of S2 foramina was 54.01 mm (range 50-60 mm).

Discussion

The average length of sacral hiatus was 25.68 mm (range 13-49 mm) which was consistent with the study by Patil Dhananjay et al (2012).¹² Anteroposterior diameter of sacral canal at the level of apex needs to be sufficient enough to admit the needle into sacral canal. In present study, it ranges from (0.3-10.4) mm which was correlated with the study of Anjali Aggarwal et al (2009).⁷

For successful Caudal Epidural Block, identification of sacral hiatus is mandatory by palpating the sacral cornua and after that the most frequently used technique to identify the caudal epidural space is based

on feeling the 'pop' on penetrating the sacrococcygeal membrane.^{9, 10} Sekiguchi et al (2004)³ and Nagar (2004)¹¹ reported that sacral cornua is covered by subcutaneous fat and cornua were flat bilaterally, that's why cornua cannot act as a landmark. For the exact location of dura, knowledge of level of apex of sacral hiatus is very important, in low apex it requires long needle. On the other hand, apex is higher; more precaution should be taken while deciding length of the needle to be introduced into the canal. In most of the studies apex was located against S4 like ours with the incidence ranging from 60 to 68%. And lowest in number at 2nd Sacral Vertebra (1.75%), 3rd Sacral Vertebra & 5th Sacral Vertebra was found (19.30%) & (14.04%) in our cases that was close by Anjali Aggarwal et al (2009)⁷ and Singh et al (2016).¹⁴

The range of length of sacral hiatus varied widely in all studies. In our study, the lower range was close to that reported by Nagar (2004)¹¹, but the upper range of this measurement in Nagar (2004)¹¹ series was much higher than ours. Thus, longer hiatus facilitates the entry into sacral canal. At the same time, it indicates reduced distance between apex of sacral hiatus and termination of dural sac thus increasing the possibility of needle puncturing the dural sac. In addition, shorter hiatus especially in obese patient because of overlying fat, may prove difficult for locating sacral hiatus. It was shorter than 10 mm in 14.04% in our study as similar to 10% Nagar (2004).¹¹ In all studies, location of base varied from S4 to coccyx. In our study base was seen most commonly against S5 in 84.21% cases and lowest location of the base was at coccyx in 15.79% in the present, whereas 72.6% and 16% in Nagar (2004).¹¹ Additional measurements are distance between two superolateral sacral crest (base of the triangle) 60.13 mm (range 57-70.30 mm), distance between right superolateral sacral crest and sacral hiatus apex 76.11 mm (range 56-94 mm), distance between left superolateral sacral crest and sacral hiatus apex 78.53 mm (range 56-102 mm) forming nearly an equilateral triangle between superolateral sacral crest and sacral hiatus apex in most of the sacrum. This equilateral triangle can act as guide to the

location of the apex of sacral hiatus during caudal epidural block and clinicians can avoid problem of failure in needle placement. Our study is similar to the studies by Anjali Aggarwal et al (2009)⁷, and Patil Dhananjay et al (2012).¹² In present study, transverse width of sacral hiatus at the level of base 12.54 mm which was consistent with the study by Dipali Rani Pal et al (2012).¹³ Average distance between sacral apex to level of S2 foramina was 30.27 mm (range 17-43 mm) and distance between sacral base to level of S2 foramina was 54.01 mm (range 50-60 mm). Dural sac in adults terminates most commonly at S2. So, the distance between apex of hiatus and S2 level decides the length of the needle that can be safely introduced into the canal.

Conclusion

The equilateral nature of the triangle formed between the two superolateral sacral crests and the apex of sacral hiatus will be of practical benefit to the clinician in determining the location of the sacral hiatus during CEB. So, the most important anatomical landmarks for performing CEB are: sacral cornua, triangle formed by right and left superolateral sacral crest and apex of sacral hiatus, distance between apex of sacral hiatus and S2 level, anteroposterior depth of sacral canal at apex of sacral hiatus and intercornual distance. These landmarks may increase the probability of needle placement into the sacral canal.

References

1. Standring S, Ellis H, Healy JC, Williams A. Gray's Anatomy: Back and Microscopic Anatomy of Spinal Cord. 39th edn. Elsevier. 2008;750-751.
2. Peter LW. Gray's Anatomy. 38th edn. London: Churchill Livingstone. 2000;531-92.
3. Sekiguchi M, Yabuki S, Satoh K, Kikuchi S. An anatomic study of the sacral hiatus: a basis for successful caudal epidural block. Clin J Pain. 2004; 20: 51-54.
4. Senoglu N, Senoglu M, Oksuz H et al. Landmark of the Sacral hiatus for caudal epidural block: an anatomical study. Br J Anaes. 2005; 95(5): 692-695, doi:10.1093/bja/aei236.
5. Carette S, Leclaire R, Marcoux S, et al. Epidural corticosteroid injections for sciatica due to herniated nucleus pulposus. N Engl J Med. 1997; 336:1634-40.
6. Gudaityte J, Marchertiene I, Pavalkis D. Anesthesia for ambulatory anorectal surgery. Medicina (Kaunas), 2004; 40:101-11.
7. Aggarwal A, Aggarwal A, Harjeet, Sahni D. Morphometry of sacral hiatus and its clinical relevance in caudal epidural block. Surg Radiol Anat. 2009;31(10):793-800, <https://doi.org/10.1007/s00276-009-0529-4>.
8. Price CM, Rogers PD, Prosser AS, et al. Comparison of the caudal and lumbar approaches to the epidural space. Ann Rheum Dis, 2000; 59: 879-82.
9. Chen PC, Tang SFT, Hsu TC. Ultrasound guidance in caudal epidural needle placement. Anesthesiology 2004; 101:181-4.
10. Tusi BC, Tarkkila p, Gupta S, Kearney R. Confirmation of caudal needle placement using nerve stimulation. Anesthesiology 1999; 91: 374-8.
11. Nagar SK. A study of sacral hiatus in dry human sacra. Journal of Anatomical Society of India 2004;53(2): 18-21.
12. Patil Dhananjay S, JadavHrishikesh R, Binodkumar, Mehta CD, Patel Vipul D. Anatomical study of Sacral Hiatus for Caudal Epidural Block. National Journal of Medical Research. Sept 2012;2(3): 1-6.
13. Dipali Rani Pal, Md. Ashfaqur Rahman, KaniJFatema. Morphometric study of sacral hiatus: A basis for successful caudal epidural block. Bangladesh journal of anatomy. January 2012; 10 (1): 5-10, DOI: <https://doi.org/10.3329/bja.v10i1.15750>.
14. Singh P, Singh R, Rani Archana, et al. Morphological and Morphometrical Study of Sacral Hiatus in North Indian Population. Journal of Biological and Chemical Research. 2016;33(2): 616-628, <https://www.researchgate.net/publication/309444876>. DOI:10.1016/j.jasi.2016.08.225.

(TMSS Medical College Journal 2022; 19(2): 23-27)