



## Original Article

# A Comparative Evaluation of Peripheral Perfusion Index vs Anal Sphincter Tone to assess the Onset of Caudal Block in Pediatric Lower Abdominal Surgeries

Authors

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## Abstract

**Background:** *In pediatric lower abdominal surgeries, caudal block approach is better and efficient than general anaesthesia and provides excellent post-op pain control. Onset of caudal block is assessed by loss of cremasteric reflex, hemodynamic changes, loss of anal tone and increase in perfusion index. Studies comparing the predictors for onset of caudal block are very limited and not much of studies is about perfusion index.*

**Aims & Objectives:** *To compare if the onset of caudal is first demonstrated by rise in PI or by loss of anal sphincter tone and to emphasize the importance of peripheral perfusion index.*

**Methodology:** *This is a Prospective Randomized single blinded study in Pediatric surgery Operation Theatre, TVMCH, with a sample size of 100 Children of age <8 years belonging to ASA I or II. Patient premedicated. Monitors connected. Peripheral IV line secured. Pre-procedural vitals noted. Perfusion index in lower limb noted. Caudal block is given in aseptic conditions using 22G hypodermic needle with bupivacaine 0.25% in a volume of 1ml/kg. Throughout the procedure the child is thoroughly monitored and all vitals are recorded. Earliest increase in PI is noted using masimpulse-oximeter. Followed by this PI is noted at 2 mins, 5 mins, 10 mins and 20 mins (P1,P2,P3,P4 respectively). Using sterile glove and lignocaine jelly, laxity of anal tone (DRESS Score) is recorded at 5 mins, 10 mins and 20 mins (A1, A2, A3 respectively).*

**Results:** *Perfusion index is an objective & non-invasive monitor that predicts the caudal onset much earlier than Anal sphincter tone as evidenced by the study.*

**Keywords:** *Caudal anaesthesia, perfusion index, anal sphincter tone.*

## Introduction

Caudal anesthesia was described at the turn of last century by two French physicians, Fern and Cathelin and Jean-Anthanase Sicard. The

technique pre-dated the lumbar approach to epidural block by several years.

Caudal anesthesia, however, did not gain in popularity immediately following its inception.

One of the major reasons caudal anesthesia was not embraced is the wide anatomical variations of sacral bones and the consequent failure rate associated with attempts to locate the sacral hiatus.

The failure rate of 5% to 10% made caudal epidural anesthesia unpopular until a resurgence of interest in the 1940s, led by Hingson and colleagues, who used it in obstetrical anesthesia. Caudal epidural anesthesia has many applications, including surgical anesthesia in children and adults, as well as the management of acute and chronic pain conditions.

Success rates of 98%–100% can be achieved in infants and young children before the age of puberty, as well as in lean adults. The technique of caudal epidural block in pain management has been greatly enhanced by the use of fluoroscopic guidance and epidurography, in which high success rates can be attained.

### Aim of the Study

To compare whether the onset of Caudal Epidural block is first demonstrated by Rise in Peripheral Perfusion Index or by Loss of Anal Sphincter Tone and to emphasize the importance of Peripheral Perfusion Index

### Materials and Methods

**Study Design:** Prospective Randomized single blinded study

**Sample Size:** 100

#### Inclusion Criteria

- Children of age <8 years belonging to ASA I or II with written informed consent from parents.

#### Exclusion Criteria

- ASA III & IV
- Patients not satisfying inclusion criteria
- Patients with diabetes, hypertension, coronary artery disease, renal/hepatic/cerebral insufficiency
- Patients with coagulopathies or receiving drugs influencing blood coagulation.

- Local infection/congenital malformities at the site of caudal.
- Upper respiratory tract infection, h/o asthma

### Study Methods

- After getting ethical committee approval and consent from patient's informant, Prospective Randomized single blinded study was done in 100 patients.
  - Preoperative assessment was done
  - Patients were examined thoroughly with evaluation of history and clinical examination
  - Anaesthetic machine was checked before starting the procedure
  - Ensured the availability of working laryngoscope, oral airway, endotracheal tube of various sizes
  - Made sure that the essential emergency drugs were available
  - Intravenous access was secured with 20G venflon.
  - In operating room routine monitoring including ECG, NIBP, pulse oximeter was attached.
  - Each Patients were given premedication inj.Glycopyrolate 40mcg/kg intramuscular 45 mts before surgery and inj midazolam 0.05mg/kg intravenous and inj.Fentanyl 2mcg/kg intravenous before induction.
  - Baseline cardio-respiratory parameters like heart rate, Blood pressure, and oxygen saturation, EtCO<sub>2</sub> were recorded before caudal epidural block given.
  - Perfusion index in lower limb noted
  - Caudal block was given in aseptic conditions using 22G hypodermic needle with bupivacaine 0.25% in a volume of 1ml/kg.
  - Earliest increase in PI is noted using masimo pulse-oximeter.
- Followed by this PI is noted at 2mins, 5mins, 10 mins and 20 mins (P1,P2,P3,P4 respectively).
- Using sterile glove and lignocaine jelly, laxity of anal tone (DRESS Score) is recorded at 5 mins, 10 mins and 20 mins (A1, A2, A3 respectively).

- Throughout the procedure the child is thoroughly monitored and all vitals are recorded.
- Complications during intraoperative periods and post operative period were noted
- After the end of surgery Patient was shifted to post operative ward for observation.

## Results and Observation

### I. Basic Demographic Characteristics of Study Population

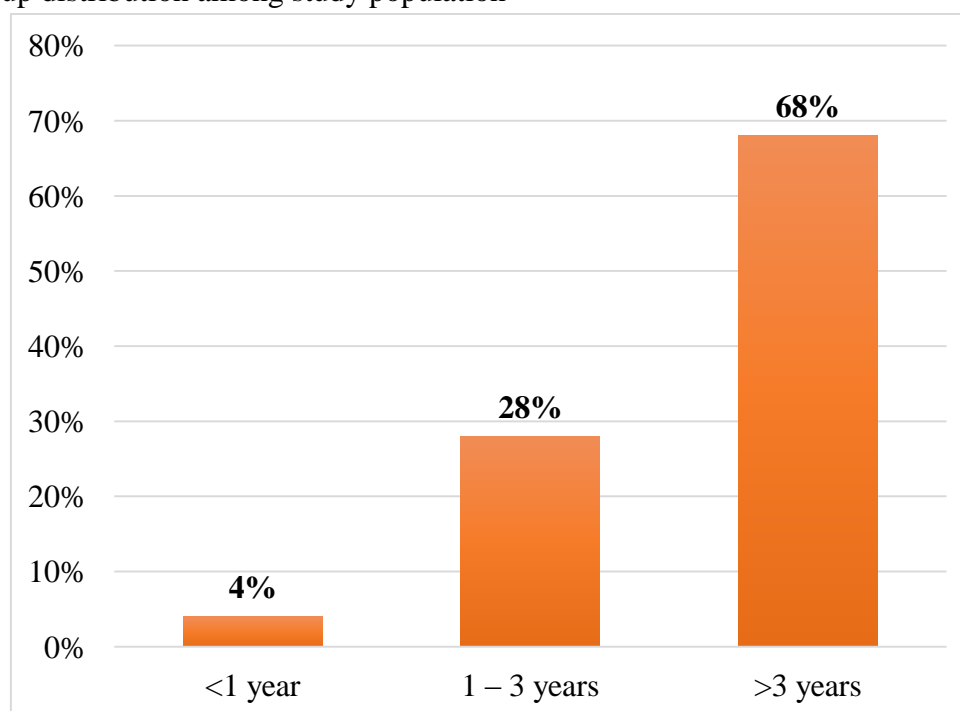
**Table:** Age group distribution among study population

Age group	Number	Percentage (%)
<1 year	4	4%
1 – 3 years	28	28%
>3 years	68	68%
Total	100	100%
Minimum	2 months	
Maximum	7 years	
Mean	42.4 months	
Median	42 months	
Standard deviation	22.6 months	

Majority (68%) of study participants belonged to >3years, 28% of the participants belonged to 1-3 years and 4% belonged to <1 years. Mean age is

42.4 months. The age ranged between 2 months and 7 years.

**Chart:** Age group distribution among study population

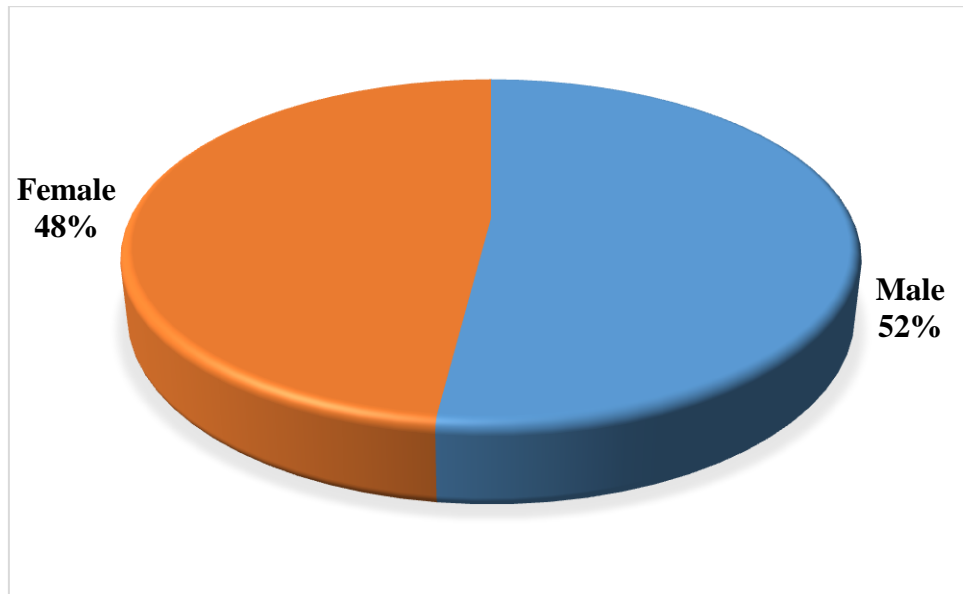


**Table:** Gender distribution among study population

Gender	Number	Percentage (%)
Male	52	52%
Female	48	48%
Total	100	100.0

Males were 52% in the study population and females were 48%.

**Chart:** Gender distribution among study population

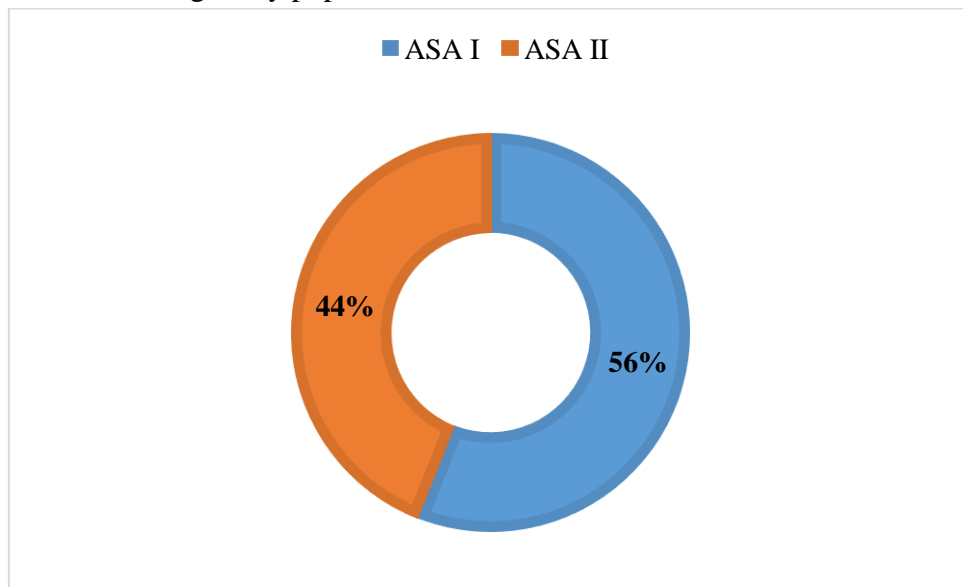


**Table:** ASA distribution among study population

ASA	Number	Percentage (%)
I	56	56%
II	44	44%
Total	100	100.0

56% of the participants belonged to ASA grade I and 44% of the participants belonged to ASA grade I.

**Table:** ASA distribution among study population



**Table:** Height distribution among study population

	Mean	Median	Standard deviation	Minimum	Maximum
Height	91.15cm	92	13.50	55	116

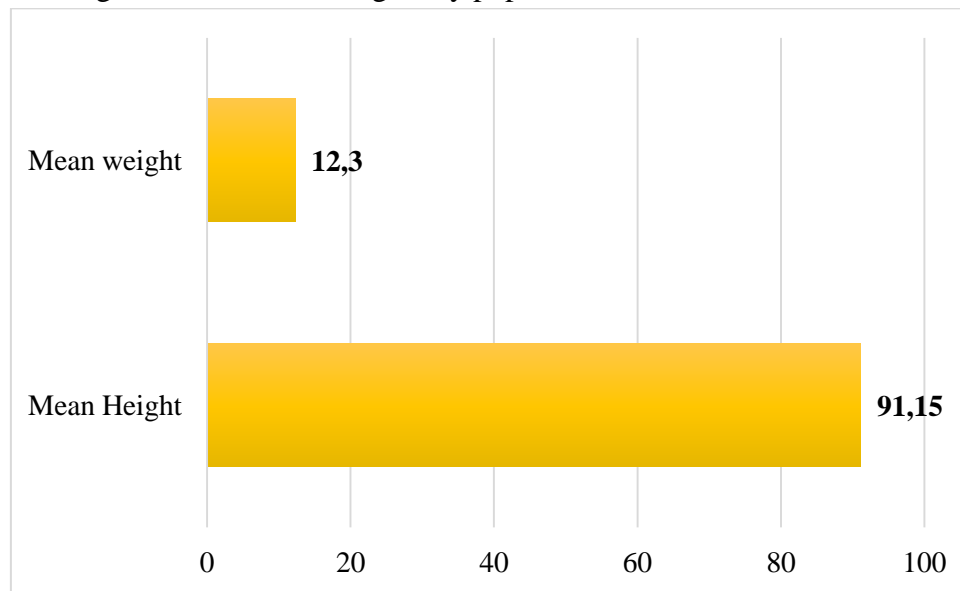
The mean height among study participants is 91.15, standard deviation is 13.5. Height ranged between 55 cm to 116 cm.

**Table:** Weight distribution among study population

	Mean	Median	Standard deviation	Minimum	Maximum
Weight	12.3	12	4	4	21

The mean weight among study participants is 12.3, standard deviation is 4. Weight ranged between 4 to 21 kg.

**Table:** Height and Weight distribution among study population



**Table:** Baseline Haemodynamic parameters among study population

	Mean	Median	Standard deviation	Minimum	Maximum
Heart rate	120.8	120	13.9	96	162
Systolic BP	100.5	100	15.2	74	176
Diastolic BP	59.1	60	7.8	40	76
Spo2	99.5	100	0.674	98	100

The mean Heart rate among study participants is 120.8, standard deviation is 13.9. Heart rate ranged between 96 to 162. The mean SBP among study participants is 100.5, standard deviation is 15.2. SBP ranged between 74 to 176. The mean

DBP among study participants is 59.1, standard deviation is 7.8. SBP ranged between 40 to 76. The mean Spo2 among study participants is 99.5, standard deviation is 0.674. Spo2 ranged between 98 to 100.

**II. Study Parameters Distribution among Study Population**

**Distribution and association of Anal sphincter tone (DRESS Score) at various time points following caudal block**

**Table:** Distribution of Dress score at various time points

DRESS SCORE	Baseline	5 minutes	10 minutes	20 minutes
0 (No discernable tone)	0	0 (0%)	42 (42%)	88 (88%)
1 (Very low tone)	0	49(49%)	49(49%)	11 (11%)
2 (Mildly decreased tone)	0	48(48%)	9(9%)	1 (1%)
3 (Normal tone)	100 (100%)	3(3%)	0(0%)	0 (0%)

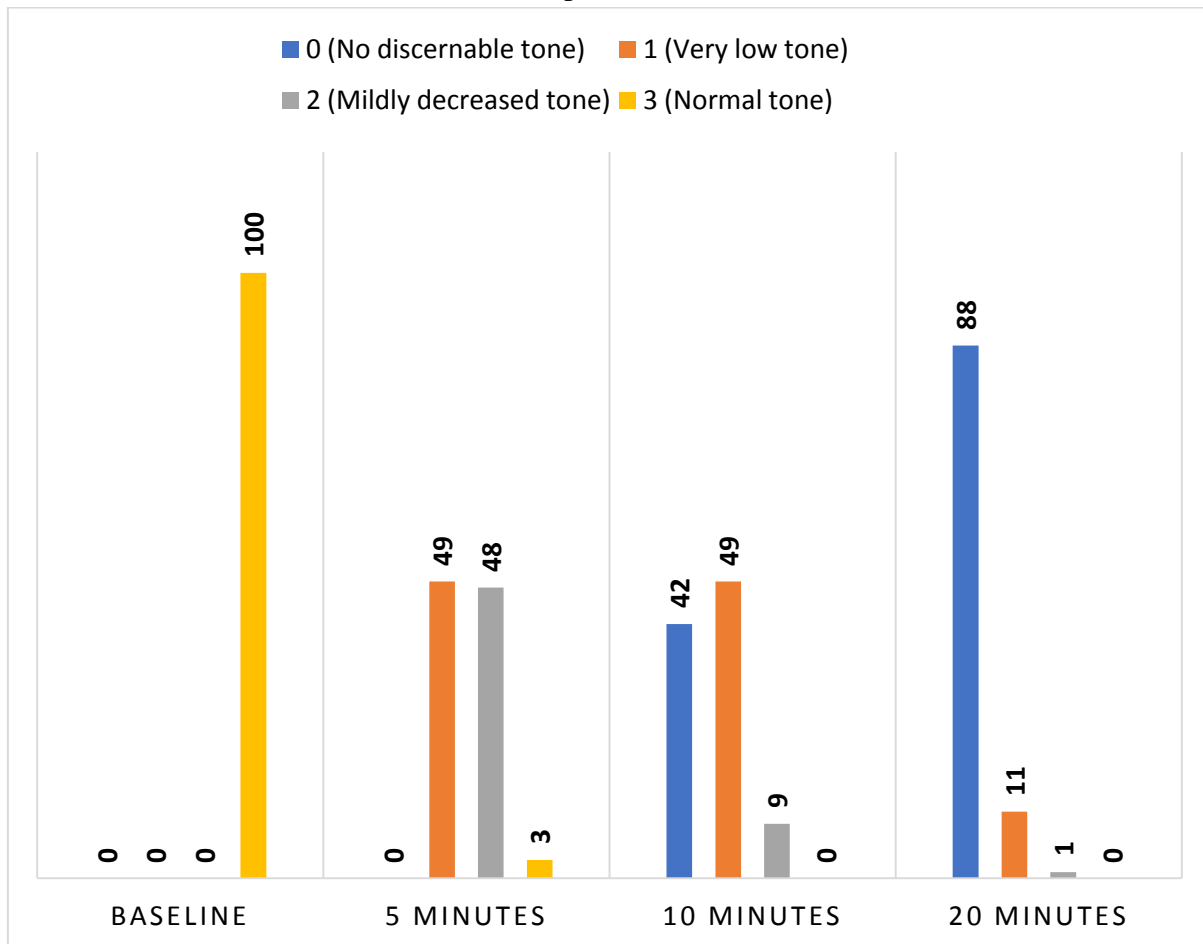
At baseline all 100 participants had normal anal sphincter tone with DRESS score 3. At 5 minutes

only 3% had normal tone, 48% had mildly decreased and 49% had very low tone. At 10

minutes 42% had no discernable tone at rest, 49% had very low tone and 9% had mildly decreased tone. At 20 minutes 88% had no discernable

score, 11% had very low tone and only 1% had mildly decreased tone.

**Chart:** Distribution of Dress score at various time points



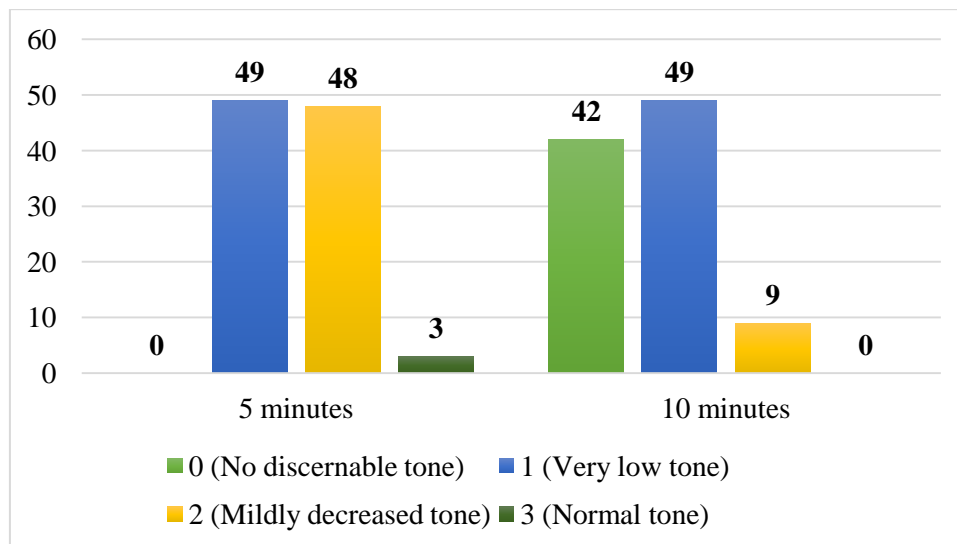
**Table:** Association of DRESS SCORE assessed at 5 minutes Vs 10 minutes

DRESS Score At 5 mins	DRESS Score at 10 mins			Total	Chi square value	P value
	0	1	2			
1	34 (69.4%)	15 (30.6%)	0	49 (100%)	59.533	<0.001*
2	8 (16.7%)	34 (70.8%)	6 (12.5%)	48 (100%)		
3	0 (0%)	0 (0%)	3 (100%)	3 (100%)		
Total	42 (42%)	49 (49%)	9 (9%)	100 (100%)		

At 5 minutes a total 49 participants had DRESS Score is 1 (Very low tone), among them 69.4% had no discernable tone by 10 minutes. 48 participants had mildly decreased tone at 5 minutes 71% of them had very low tone by 10

minutes. 3 participants with normal tone at 5 minutes had mildly decreased tone at 10 minutes. There was a significant difference in distribution of DRESS Score between 5 and 10 minutes with P < 0.001.

**Chart:** Association of DRESS SCORE assessed at 5 minutes Vs 10 minutes



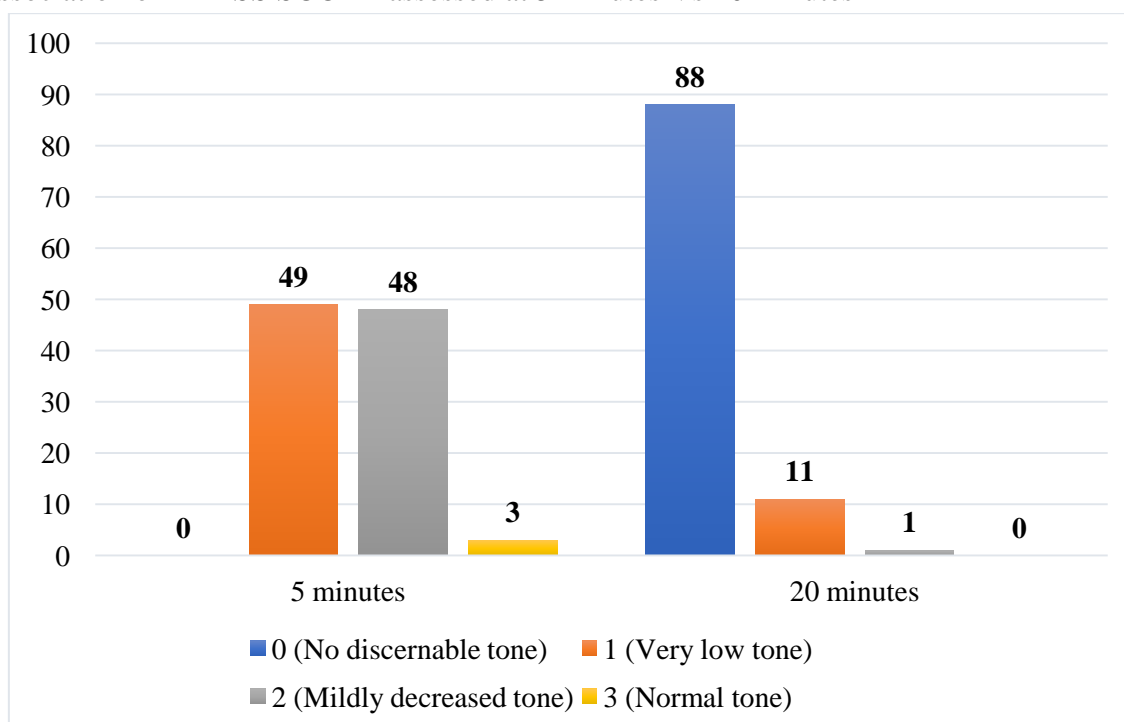
**Table:** Association of DRESS SCORE assessed at 5 minutes Vs 20 minutes

DRESS Score At 5 mins	DRESS Score at 20 mins			Total	Chi square value	P value
	0	1	2			
1	49 (100%)	0 (0%)	0 (0%)	49 (100%)	33.169	<0.001*
2	38 (81.2%)	8 (16.7%)	1 (2.1%)	48 (100%)		
3	0 (0%)	3 (100%)	0 (0%)	3 (100%)		
Total	88 (88%)	11 (11%)	1 (1%)	100 (100%)		

At 5 minutes a total 49 participants had DRESS Score is 1 (Very low tone), among them 100% had no discernable tone by 20 minutes. 48 participants had mildly decreased tone at 5 minutes 81% of them had no discernable tone by

20 minutes. 3 participants with normal tone at 5 minutes had very low tone at 20 minutes. There was a significant difference in distribution of DRESS Score between 5 and 20 minutes with  $P < 0.001$ .

**Chart:** Association of DRESS SCORE assessed at 5 minutes Vs 20 minutes



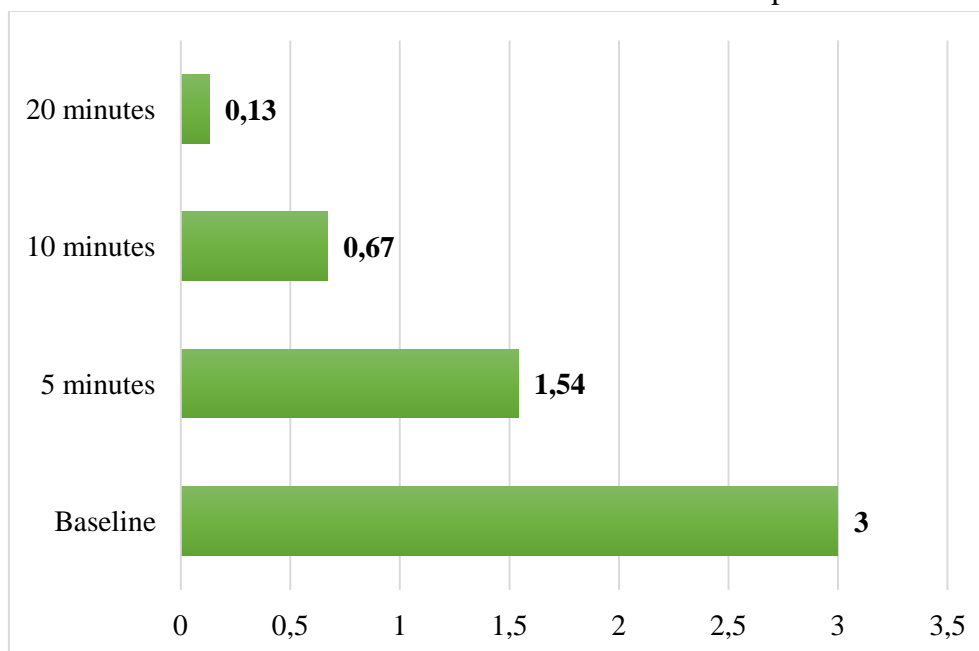
**Table:** Distribution and association of mean DRESS Score at various time points

Time points	Mean DRESS score	Standard Deviation	Mean difference from Baseline	T statistics	P value
Baseline	3	0			
5 minutes	1.54	0.558	1.460	26.159	<0.001
10 minutes	0.67	0.637	2.330	36.606	<0.001
20 minutes	0.13	0.367	2.870	78.273	<0.001

The mean DRESS score at baseline was 3 (Normal tone). At 5 minutes the mean DRESS Score is 1.54 and standard deviation is 0.558. The mean difference in score from baseline is 1.460 this difference was statistically significant with P<0.001. At 10 minutes the mean DRESS Score is 0.67 and standard deviation is 0.637. The mean

difference in score from baseline is 2.330 this difference was statistically significant with P<0.001. At 20 minutes the mean DRESS Score is 0.13 and standard deviation is 0.367. The mean difference in score from baseline is 2.870 this difference was statistically significant with P<0.001.

**Chart:** Distribution and association of mean DRESS Score at various time points



**Table:** Distribution and association of Perfusion index at various time points following caudal block:

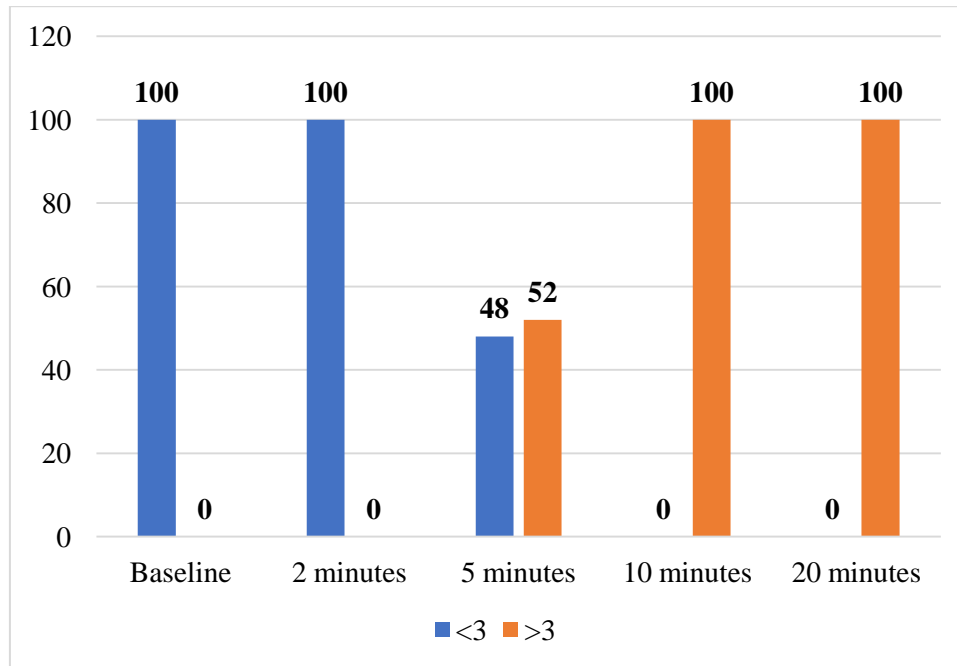
Perfusion Index score	Baseline	2 minutes	5 minutes	10 minutes	20 minutes
<3	100	100	48	0	0
>3	0	0	52	100	100

At Baseline all 100 participants had perfusion index of <3, at 2 minutes also all 100 participants had perfusion index <3. At 5 minutes 52% had perfusion index >3 and 48% had perfusion index

<3. By 10 minutes all 100 participants had perfusion index >3. Perfusion index >3 indicated caudal block by 10 minutes in all participants.



**Chart:** Distribution and association of Perfusion index at various time points following caudal block:



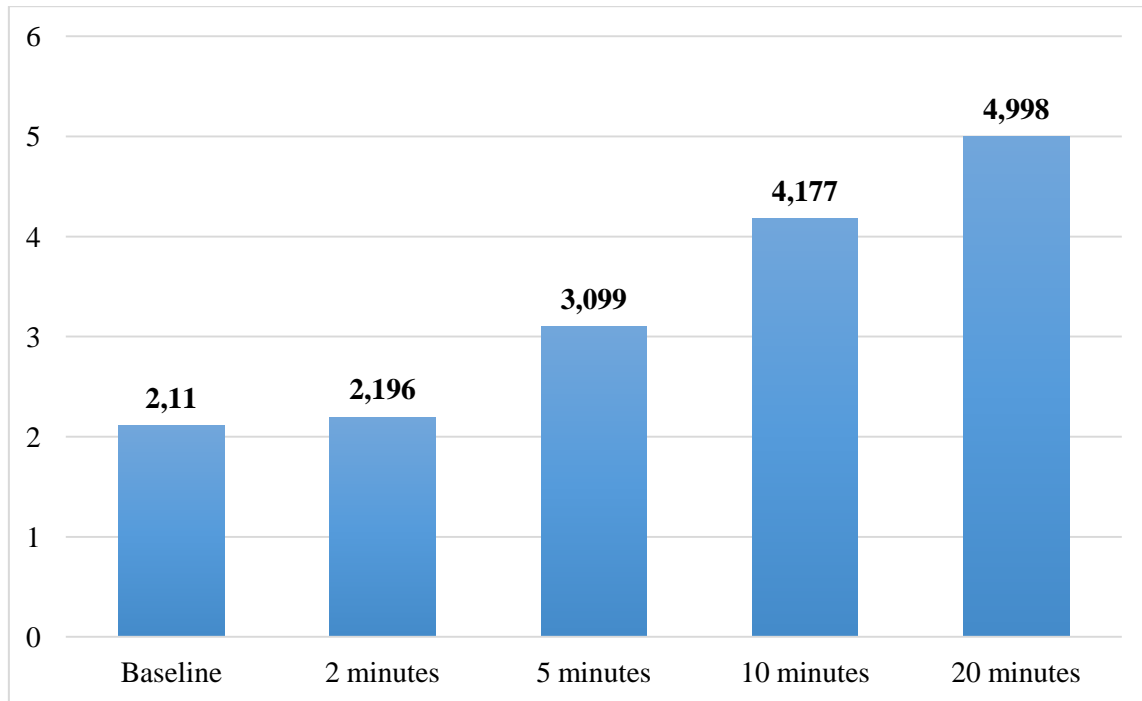
**Table:** Distribution and association of mean Perfusion Index at various time points

Time points	Mean Perfusion Index	Standard Deviation	Mean Difference from Baseline	T statistics	P value
Baseline	2.11	0.314			
2 minutes	2.196	0.259	-0.086	-3.108	<b>0.002</b>
5 minutes	3.099	0.428	-0.989	-18.897	<b>&lt;0.001</b>
10 minutes	4.177	0.313	-2.067	-46.716	<b>&lt;0.001</b>
20 minutes	4.998	0.315	-2.888	-66.979	<b>&lt;0.001</b>

The mean perfusion index at baseline was 2.11. At 2 minutes the mean perfusion index is 2.196 and standard deviation is 0.259. The mean difference in perfusion index from baseline is 0.086 this difference was statistically significant with P=0.002. At 5 minutes the mean perfusion index is 3.09 and standard deviation is 0.428. The mean difference in perfusion index from baseline is 0.989 this difference was statistically significant

with P<0.001. At 10 minutes the mean perfusion index is 4.177 and standard deviation is 0.313. The mean difference in perfusion index from baseline is 2.067 this difference was statistically significant with P<0.001. At 20 minutes the mean perfusion index is 4.998 and standard deviation is 0.315. The mean difference in perfusion index from baseline is 2.888 this difference was statistically significant with P<0.001.

**Chart:** Distribution and association of mean Perfusion Index at various time points



### III. Distribution of Haemodynamic Parameters at Various Time Points

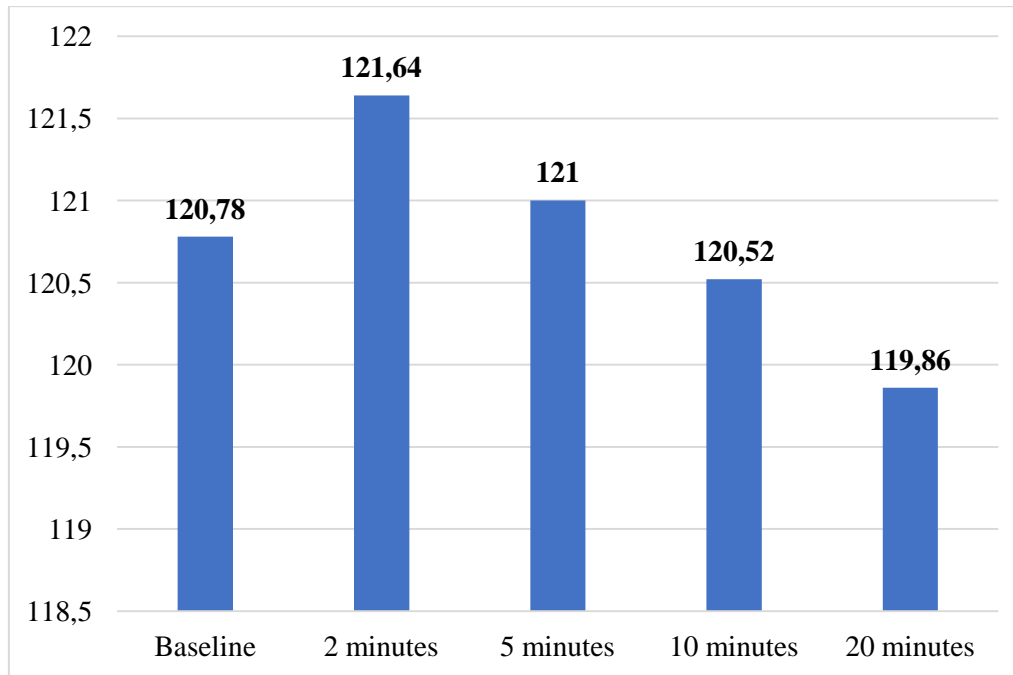
**Distribution and association of Heart Rate at various time points**

Time points	Mean Heart Rate	Standard Deviation	Mean Difference	T statistics	P value
Baseline	120.78	13.978			
2 minutes	121.64	15.049	-0.86	-2.44	0.016
5 minutes	121	14.718	-0.22	-0.655	0.514
10 minutes	120.52	13.674	0.26	0.758	0.45
20 minutes	119.86	14.349	0.92	2.736	0.007

The mean Heart rate at baseline was 120.78. At 2 minutes the mean Heart rate is 121.6 and standard deviation is 15.04. The mean difference in Heart rate from baseline is 0.86 this difference was statistically significant with P=0.016. At 5 minutes mean Heart rate is 121 and standard deviation is 14.7. The mean difference in Heart rate from baseline is 0.22 this difference was not statistically significant with P=0.514. At 10

minutes the mean Heart rate is 120.5 and standard deviation is 13.67. The mean difference in Heart rate from baseline is 0.26 this difference was not statistically significant with P=0.45. At 20 minutes the mean Heart rate is 119.8 and standard deviation is 14.35. The mean difference in Heart rate from baseline is 0.92 this difference was statistically significant with P=0.007.

**Chart:** Distribution and association of Heart Rate at various time points



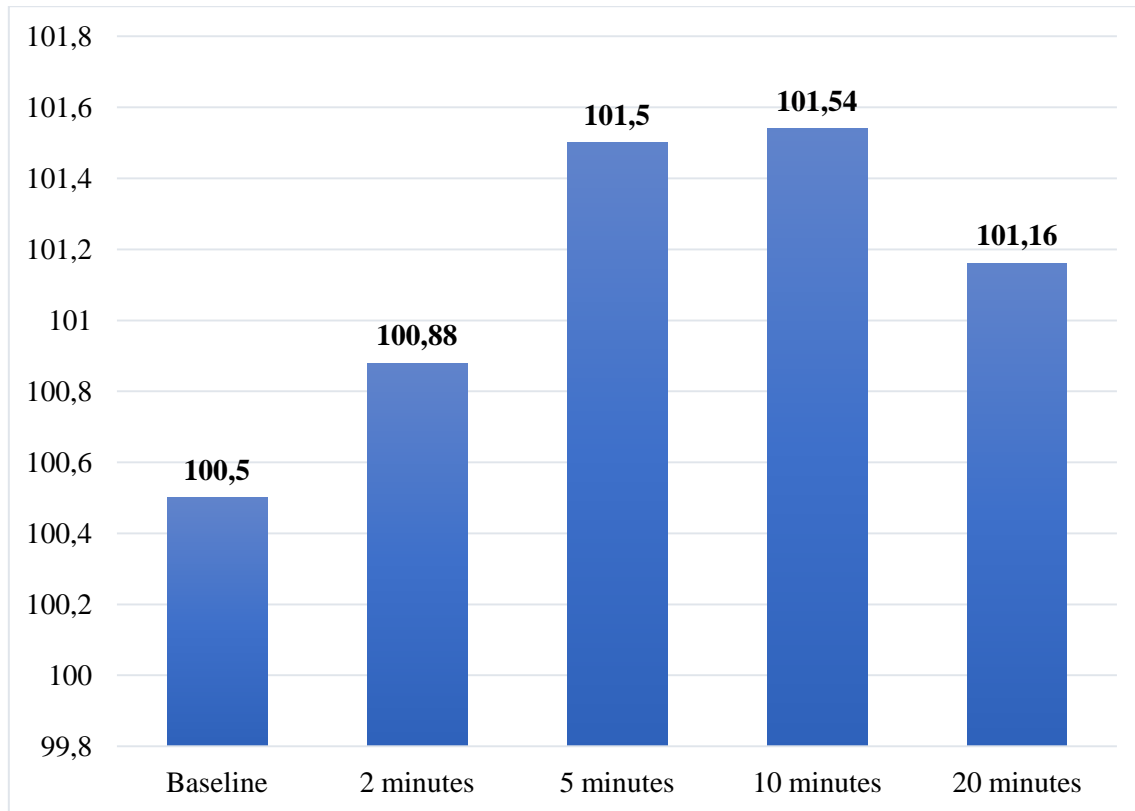
**Table:** Distribution and association of Systolic Blood Pressure at various time points

Time points	Mean Systolic Blood Pressure	Standard Deviation	Mean Difference	T statistics	P value
Baseline	100.5	15.27			
2 minutes	100.88	13.822	-0.38	-0.525	0.601
5 minutes	101.5	13.652	-1	-1.502	0.136
10 minutes	101.54	13.618	-1.04	-1.602	0.112
20 minutes	101.16	14.414	-0.66	-0.869	0.387

The mean SBP at baseline was 100.5. At 2 minutes the mean SBP is 100.8 and standard deviation is 13.8. The mean difference in SBP from baseline is 0.38 this difference was not statistically significant with P=0.601. At 5 minutes mean SBP is 101.5 and standard deviation is 13.65. The mean difference in SBP from baseline is 1 this difference was not statistically significant with P=0.136. At 10

minutes the mean SBP is 101.54 and standard deviation is 13.6. The mean difference in SBP from baseline is 1.04 this difference was not statistically significant with P=0.112. At 20 minutes the mean SBP is 101.1 and standard deviation is 14.41. The mean difference in SBP from baseline is 0.66 this difference was not statistically significant with P=0.387.

**Chart:** Distribution and association of Systolic Blood Pressure at various time points



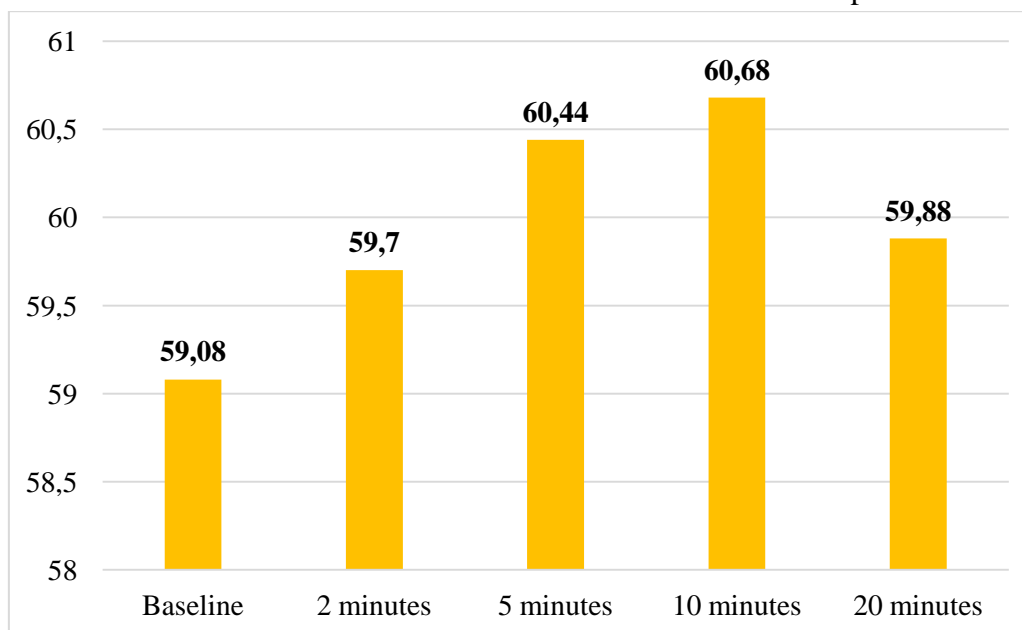
**Table:** Distribution and association of Diastolic Blood Pressure at various time points

Time points	Mean Diastolic Blood Pressure	Standard Deviation	Mean Difference	T statistics	P value
Baseline	59.08	7.844			
2 minutes	59.7	8.439	-0.62	-1.567	0.12
5 minutes	60.44	8.148	-1.36	-4.444	<0.001
10 minutes	60.68	8.161	-1.6	-5.204	<0.001
20 minutes	59.88	8.029	-0.8	-3.388	0.001

The mean DBP at baseline was 59.08. At 2 minutes the mean DBP is 59.7 and standard deviation is 8.4. The mean difference in DBP from baseline is 0.62 this difference was not statistically significant with P=0.12. At 5 minutes mean DBP is 60.44 and standard deviation is 8.14. The mean difference in DBP from baseline is 1.36 this difference was statistically significant with

P<0.001. At 10 minutes the mean DBP is 60.6 and standard deviation is 8.16. The mean difference in DBP from baseline is 1.6 this difference was statistically significant with P<0.001. At 20 minutes the mean DBP is 59.8 and standard deviation is 8.0. The mean difference in DBP from baseline is 0.8 this difference was statistically significant with P<0.001.

**Table:** Distribution and association of Diastolic Blood Pressure at various time points

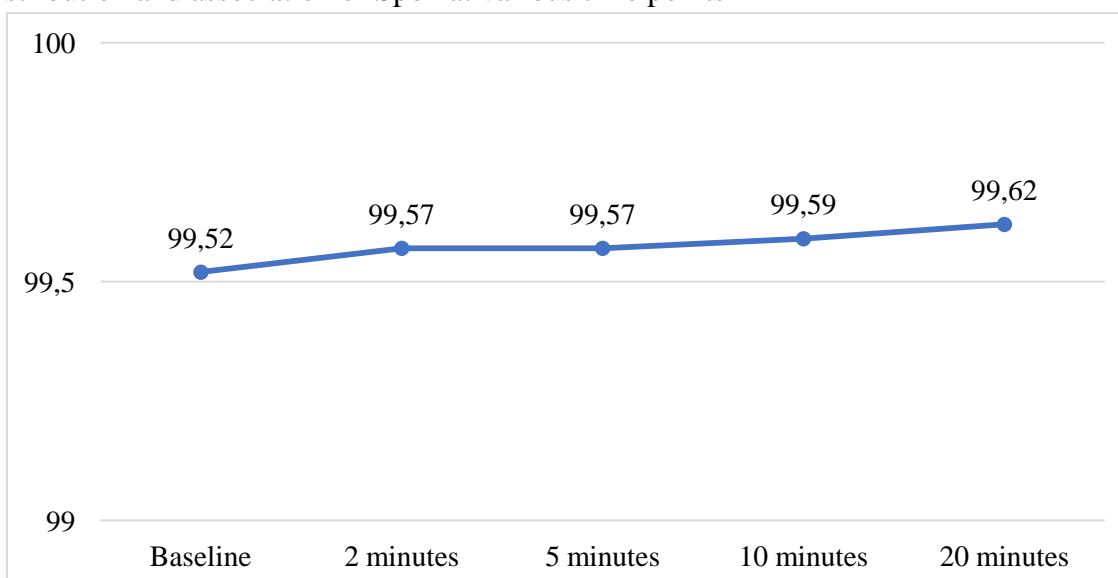


**Table:** Distribution and association of Spo2 at various time points

Time points	Mean SPO2	Standard Deviation	Mean Difference	T statistics	P value
Baseline	99.52	0.674			
2 minutes	99.57	0.64	-0.05	-0.869	0.387
5 minutes	99.57	0.64	-0.05	-0.609	0.544
10 minutes	99.59	0.621	-0.07	-0.724	0.471
20 minutes	99.62	0.599	-0.1	-1.254	0.213

The mean Spo2 remained almost same from baseline till 20 minutes, 99.5 at baseline, 2 minutes and 5 minutes, 99.6 at 10 minutes and 20 minutes. There was no significant difference in Spo2.

**Chart:** Distribution and association of Spo2 at various time points



## Discussion

Caudal block is one of the commonest regional techniques performed in children especially for lower abdominal surgeries. It is usually performed under i.v. sedation which makes it difficult to assess the success & onset of the caudal block. So, there have been various methods/tests to detect the success of the caudal block like Swoosh test, Anal sphincter tone test, Heart rate & Blood pressure response to surgical incision.

Recently, Perfusion index has been used to assess the success of epidural anaesthesia in adults. Perfusion index is noninvasive and indirect technique that measures the peripheral perfusion. Decrease in Perfusion index can occur as a result of local vasoconstriction while vasodilatation results in increase in perfusion index.

Following caudal block there will be sympathectomy that results in reduced vasomotor tone and increased peripheral perfusion thereby resulting in a increase in perfusion index. Internal Anal Sphincter is under the control of Sympathetic fibers (contraction) and parasympathetic fibers (relaxation). Following caudal block, the anal sphincter becomes lax due to sympathectomy. The tone was assessed by the surgeon in all the cases.

In our study, At baseline all 100 participants had normal anal sphincter tone with DRESS score 3. At 5 minutes only 3% had normal tone, 48% had mildly decreased and 49% had very low tone. At 10 minutes 42% had no discernable tone at rest, 49% had very low tone and 9% had mildly decreased tone. At 20 minutes 88% had no discernable score, 11% had very low tone and only 1% had mildly decreased tone.

In our study, The mean DRESS score at baseline was 3 (Normal tone). At 5 minutes the mean DRESS Score is 1.54 and standard deviation is 0.558. The mean difference in score from baseline is 1.460 this difference was statistically significant with  $P<0.001$ . At 10 minutes the mean DRESS Score is 0.67 and standard deviation is 0.637. The mean difference in score from baseline is 2.330 this difference was statistically significant with

$P<0.001$ . At 20 minutes the mean DRESS Score is 0.13 and standard deviation is 0.367. The mean difference in score from baseline is 2.870 this difference was statistically significant with  $P<0.001$ .

In our study, At 5 minutes a total 49 participants had DRESS Score is 1 (Very low tone), among them 100% had no discernable tone by 20 minutes. 48 participants had mildly decreased tone at 5 minutes 81% of them had no discernable tone by 20 minutes. 3 participants with normal tone at 5 minutes had very low tone at 20 minutes. There was a significant difference in distribution of DRESS Score between 5 and 20 minutes with  $P < 0.001$ .

In our study, The mean DRESS score at baseline was 3 (Normal tone). At 5 minutes the mean DRESS Score is 1.54 and standard deviation is 0.558. The mean difference in score from baseline is 1.460 this difference was statistically significant with  $P<0.001$ . At 10 minutes the mean DRESS Score is 0.67 and standard deviation is 0.637. The mean difference in score from baseline is 2.330 this difference was statistically significant with  $P<0.001$ . At 20 minutes the mean DRESS Score is 0.13 and standard deviation is 0.367. The mean difference in score from baseline is 2.870 this difference was statistically significant with  $P<0.001$ .

In our study, At Baseline all 100 participants had perfusion index of  $<3$ , at 2 minutes also all 100 participants had perfusion index  $<3$ . At 5 minutes 52% had perfusion index  $>3$  and 48% had perfusion index  $<3$ . By 10 minutes all 100 participants had perfusion index  $>3$ . Perfusion index  $>3$  indicated caudal block by 10 minutes in all participants.

The mean perfusion index at baseline was 2.11. At 2 minutes the mean perfusion index is 2.196 and standard deviation is 0.259. The mean difference in perfusion index from baseline is 0.086 this difference was statistically significant with  $P=0.002$ . At 5 minutes the mean perfusion index is 3.09 and standard deviation is 0.428. The mean difference in perfusion index from baseline is

0.989 this difference was statistically significant with  $P < 0.001$ . At 10 minutes the mean perfusion index is 4.177 and standard deviation is 0.313. The mean difference in perfusion index from baseline is 2.067 this difference was statistically significant with  $P < 0.001$ . At 20 minutes the mean perfusion index is 4.998 and standard deviation is 0.315. The mean difference in perfusion index from baseline is 2.888 this difference was statistically significant with  $P < 0.001$ .

In our study, The mean Heart rate at baseline was 120.78. At 2 minutes the mean Heart rate is 121.6 and standard deviation is 15.04. The mean difference in Heart rate from baseline is 0.86 this difference was statistically significant with  $P = 0.016$ . At 5 minutes mean Heart rate is 121 and standard deviation is 14.7. The mean difference in Heart rate from baseline is 0.22 this difference was not statistically significant with  $P = 0.514$ . At 10 minutes the mean Heart rate is 120.5 and standard deviation is 13.67. The mean difference in Heart rate from baseline is 0.26 this difference was not statistically significant with  $P = 0.45$ . At 20 minutes the mean Heart rate is 119.8 and standard deviation is 14.35. The mean difference in Heart rate from baseline is 0.92 this difference was statistically significant with  $P = 0.007$ .

In our study, The mean SBP at baseline was 100.5. At 2 minutes the mean SBP is 100.8 and standard deviation is 13.8. The mean difference in SBP from baseline is 0.38 this difference was not statistically significant with  $P = 0.601$ . At 5 minutes mean SBP is 101.5 and standard deviation is 13.65. The mean difference in SBP from baseline is 1 this difference was not statistically significant with  $P = 0.136$ . At 10 minutes the mean SBP is 101.54 and standard deviation is 13.6. The mean difference in SBP from baseline is 1.04 this difference was not statistically significant with  $P = 0.112$ . At 20 minutes the mean SBP is 101.1 and standard deviation is 14.41. The mean difference in SBP from baseline is 0.66 this difference was not statistically significant with  $P = 0.387$

In our study, The mean DBP at baseline was 59.08. At 2 minutes the mean DBP is 59.7 and standard deviation is 8.4. The mean difference in DBP from baseline is 0.62 this difference was not statistically significant with  $P = 0.12$ . At 5 minutes mean DBP is 60.44 and standard deviation is 8.14. The mean difference in DBP from baseline is 1.36 this difference was statistically significant with  $P < 0.001$ . At 10 minutes the mean DBP is 60.6 and standard deviation is 8.16. The mean difference in DBP from baseline is 1.6 this difference was statistically significant with  $P < 0.001$ . At 20 minutes the mean DBP is 59.8 and standard deviation is 8.0. The mean difference in DBP from baseline is 0.8 this difference was statistically significant with  $P < 0.001$ .

In our study, The mean Spo2 remained almost same from baseline till 20 minutes, 99.5 at baseline, 2 minutes and 5 minutes, 99.6 at 10 minutes and 20 minutes. There was no significant difference in Spo2.

### Conclusion

In our study, in caudal success cases, though the anal sphincter tone became relaxed, it took a slightly longer time (20mts) for it to become totally lax (Score-0). In contrast, the perfusion index almost doubled (baseline mean PI 2.11 to mean PI 4.177 at 10 mts) from the baseline in a shorter time in caudal success cases. Perfusion index is an objective & noninvasive monitor that predicts the caudal onset much earlier than Anal sphincter tone.

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