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RESEARCH ARTICLE
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ORAL BETHANECHOL IN POSTPARTUM URINARY RETENTION

Dr Ankushsinh Bhadoria[1], Dr Md Rasheed[2], Dr Nagaraja N[3], Dr Tania Singh[4]*, Dr Charu Jain[5]

[1,2,3,4*,5]Department of Obstetrics & Gynaecology, Command Hospital Air Force, Bangalore

***Corresponding Author:** Dr Tania Singh
*Department of Obstetrics & Gynaecology, Command Hospital Air Force, Bangalore
Email: Singhtania151187@gmail.com

Abstract

Purpose: Postpartum urinary retention (PUR) is one of common complication observed in obstetric units. Many risk factors have been identified for PUR which includes primiparity, epidural analgesia, cesarean delivery, perineal lacerations, operative vaginal delivery, and catheterization during labor, and prolonged second-stage labor. Most commonly used mode of management is catheterization which can be sometime extended to one week duration. Oral Bethanechol is FDA approved cholinergic drug for usage of PUR. Due to lack of sufficient data and studies it is not widely used in market. So we decided to study whether usage of Bethanechol is effective in management of PUR.

Study design: Vaginally delivered patients with PUR who were managed by unit I with Bethanechol and catheter and by unit II with only catheter were observed retrospectively from medical data records between 1st dec 2021 to 30th nov 2023. Their treatment and its improvement in PUR were noted and studied for analysis in terms of number of days with catheterization and hospital stay.

Result: Out of total 1062 vaginal deliveries, total 49 vaginal delivered patients with history of PUR were analyzed for study. 23 patients (46.9 %) were managed by unit I with Bethanechol and catheter whereas 26(53.1%) were managed by unit II wit only catheterization. We have observed 59.2% patients were Primigravida whereas 40.8% patients were multigravida. Mean age of women with PUR was 26.5years and means period of gestation was 38 weeks 5 days with standard deviation of 1.25. Mean newborn birth weight was 3.25kg. In the "Bethanecol and Catheter" group, 21 participants (56.8%) required catheterization once, 2 participants (18.2%) required it twice, and none required it thrice. In the "Catheter" group, 16 participants (43.2%) required catheterization once, 9 participants (81.8%) required it twice, and 1 participant (100%) required it thrice. The Chi-square test (Fisher's exact) was used to assess the difference between the groups, and the ***p-value of 0.027 suggests a statistically significant difference*** in the number of times catheterization was required between the two groups.

Conclusion: Postpartum urinary retention is a very common condition, which is associated with the labor process. Bethanechol was found be effective in reducing the requirement of re-catheterization

in PUR. Also Bethanechol is effective especially in the early phases of PUR. Thus, it is important to institute treatment with Bethanechol in cases of complete or partial urinary retention.

Keywords: Postpartum urinary retention, Vaginal deliveries, acontractile bladder, Bethanechol, Catheterization

Introduction

Postpartum urinary retention (PUR) is one of common complication observed in obstetric units. It is also known as puerperal urinary retention (1,4) or insidious urinary retention after vaginal delivery. The prevalence of PUR varies ranges from 0.45% to 14.1%. (2).

Both bladder sensation and capability to empty spontaneously may be diminished by components of the labor and delivery process(6). Also urinary retention and bladder overdistention is common in the early puerperium. A number of studies have shown that the pudendal nerve, with afferent nerve branches (S2–4) supplying the bladder, is damaged during pelvic surgery and vaginal delivery (3). Urinary retention after vaginal delivery may be the result of injury to the pelvic, hypogastric, and pudendal nerves. The typical pelvic plexus injury is usually thought to produce the classic picture of acontractile bladder (4). Risk factors that increased the likelihood of retention include primiparity, epidural analgesia, cesarean delivery, perineal lacerations, operative vaginal delivery, and catheterization during labor, and prolonged second-stage labor(2).

Bethanechol is FDA-approved for the treatment of postoperative urinary retention, postpartum urinary retention, and overflow incontinence caused by neurogenic atony of the bladder (7, 8, 9,10). Bethanechol chloride, a cholinergic agent, that is structurally similar to acetylcholine. It works by neurologically stimulating "muscarinic cholinergic receptors" in the autonomic nervous system. In micturition, the bladder's detrusor muscle contracts (squeezing the bladder empty) while the lower sphincter relaxes simultaneously. Bethanechol increases the tone of the detrusor muscle, usually producing a contraction sufficiently strong to initiate micturition and emptying of the bladder(9,10).

Moreover catheterization increases hospital stay and henceforth increase maternal morbidities includes UTI. By reducing multiple catheterization or minimizing it, postpartum recovery can be fastened. This study was to determine whether the use of Bethanechol chloride is effective in treatment of postpartum urinary retention.

Materials and Methodology

This is a retrospective study conducted in department of obstetrics and gynecology, Command Hospital Air Force Bangalore after obtaining ethical clearance from institutional ethical committee between 1st Dec 2021 and 30th Nov 2023. The women who delivered vaginally during this period and who developed postpartum retention were observed. While evaluating the data, we found out that unit I managed patients with catheterization along oral tablet Bethanechol 25mg TDS (group A) while unit I managed with only catheterization (group B). We included all postpartum females with inability to pass urine despite having urge after delivery or after 6 h of spontaneous observation. We excluded overt DM, neurogenic disorder, urinary tract trauma developed during delivery process, history of urge incontinence or obstructive uropathy and conditions where Bethanechol is contraindicated. Both group were observed with number of times catheterization required and hospitalization days. Both groups patients were managed with catheterization with additional Tab Bethanechol 25 mg TDS for 5 days in group A patients. After 24 h, catheters were removed and spontaneous urine passage was observed. If patient was not able to pass urine then re-catheterization was done for 48 h. After 48 h of catheterization again catheter was removed and patient was allowed for spontaneous passage of urine. If again patient was not able to pass urine again re-catheterization was done for one week. Second group patients were simultaneously continued Bethanechol for 5 days. Outcome was measured in terms of re-catheterization required in both groups.

Result

During study period, out of total 1062 vaginal deliveries, 51 patients were diagnosed with postpartum urinary retention (PUR). Out of them 2 were excluded (due to urinary tract injury). So incidence in our set up was found to be 4.8% among vaginal deliveries. We finally got total 49 patients from 1st Dec 2021 to 30th Nov 2023 for our study.

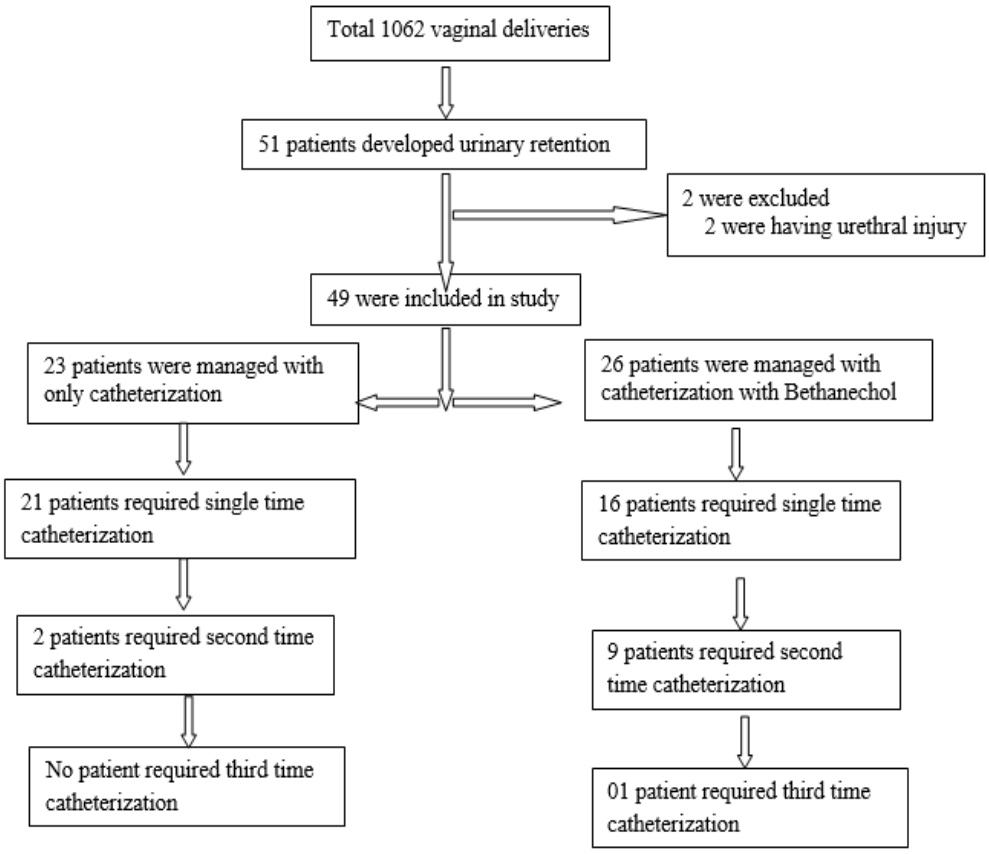


Table 1: Mean age of all the participants		
N	Mean	Standard deviation
49	26.5	3.49

The mean age of all 49 participants was 26.5 years with a standard deviation of 3.49 years.

Table 2: Mean POG of all the particpants		
N	Mean	Standard deviation
49	38.8	1.25

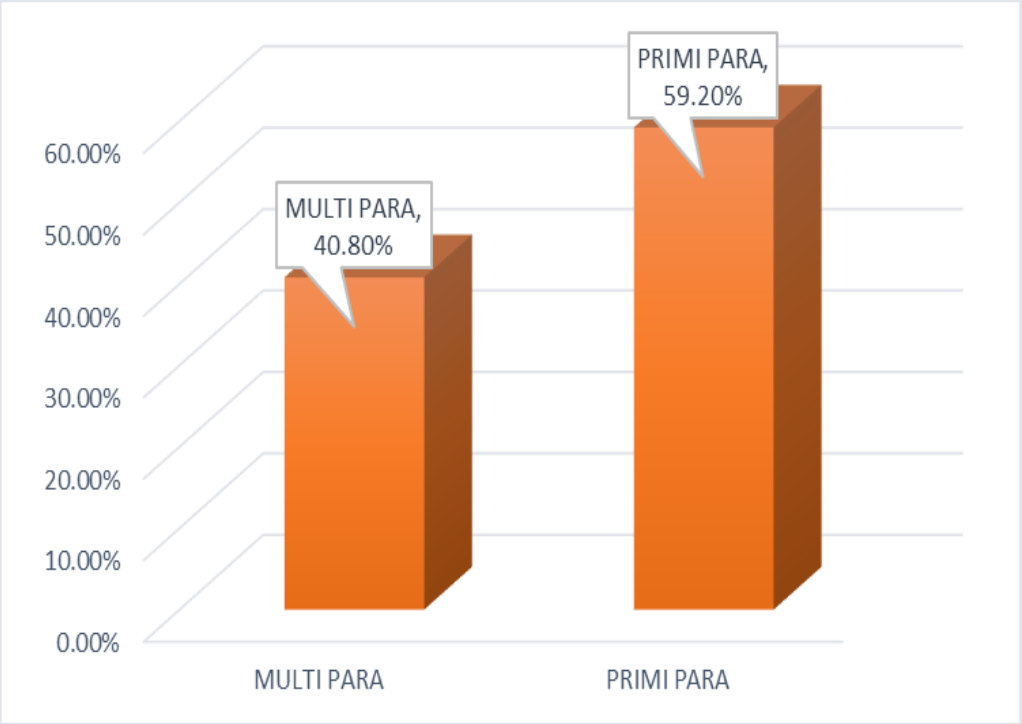
The mean period of gestation (POG) for all 49 participants was 38.8 weeks with a standard deviation of 1.25 weeks.

Table 3: Mean birthweigh of all the babies born		
N	Mean	Standard deviation
49	3.29Kgs	0.337

For all 49 babies born, the mean birth weight was 3.29 kgs with a standard deviation of 0.337 kgs.

Table 4: Parity of all the participants		
Parity	**Counts**	**%**
MULTI PARA	20	**40.80%**
PRIMI PARA	29	**59.20%**
Total	49	**100%**

Picture 1: Parity of all participants



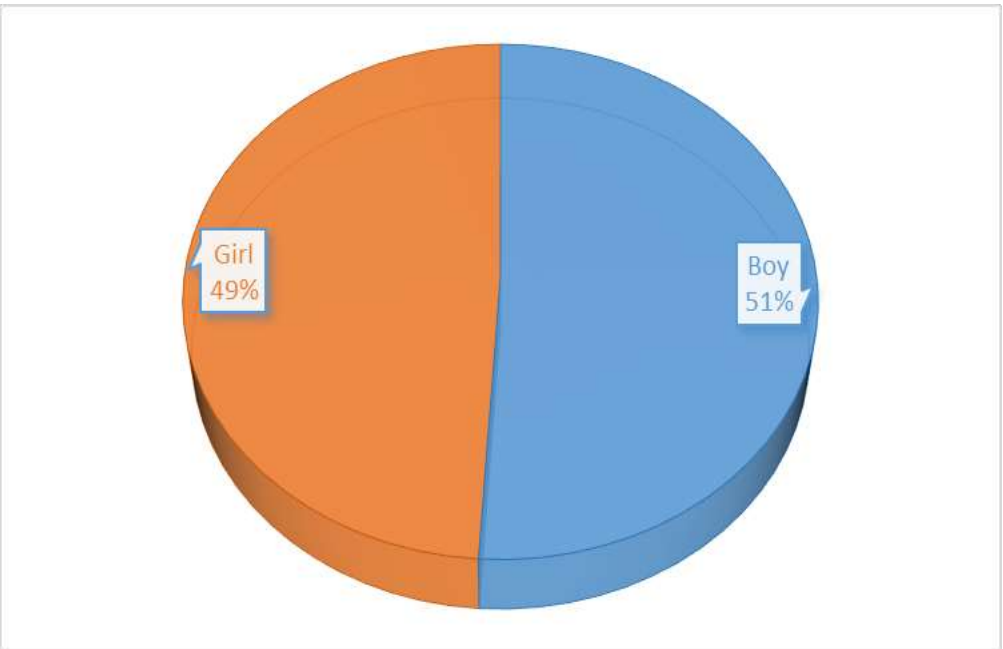
This bar chart and table depicts the parity (number of previous pregnancies) distribution of participants, showing the majority were primigravida (no previous pregnancies). Around 59.2% are primigravida and 40.8% are multigravida.

Table 5: delivery types		
Levels	**Counts**	**% of Total**
Vaginal Delivery	49	100.0 %

This table indicates that 100% of the 49 deliveries were vaginal deliveries.

Table 6: Gender of the baby		
Levels	**Counts**	**% of Total**
Boy	25	**51%**
Girl	24	**49%**
Total	49	**100%**

Picture 2: Gender of the babies born



The pie chart shows an approximately equal split between male and female babies born. Around 51% babies born were boys and remaining 49% were girls.

Table 7: Difference of mean age between both the groups								
	Group	**N**	**Mean**	**Median**	**SD**	**SE**	**Student t Test**	**P-value**
Age	**Bethanecol and Catheter**	23	26.2	25	3.98	0.831	-0.591	**0.557 Not significant**
	Catheter	26	26.8	26	3.05	0.598		

This compares the mean age between the "Bethanecol and Catheter" (n=23) and "Catheter" (n=26) groups using the Student's t-test. The mean age was 26.2 years for Bethanecol& Catheter group and the same is 26.8years for only catheter group. The p-value of 0.557 indicates the difference in mean ages is not statistically significant. Indicates the groups are homogenous i.e. comparable. It reduces the selection bias.

Table 8: Difference of mean POG between both the groups								
POG	**Group**	**N**	**Mean**	**Median**	**SD**	**SE**	**Student t Test**	**P-value**
	Bethanecol and Catheter	23	38.8	39	1.11	0.232	0.265	**0.792 Not significant**
	Catheter	26	38.7	39	1.37	0.269		

This table compares the mean period of gestation (POG) between the two groups using the Student's t-test. The mean POG for the "Bethanecol and Catheter" group was 38.8 weeks (median 39 weeks, SD 1.11 weeks) and for the "Catheter" group was 38.7 weeks (median 39 weeks, SD 1.37 weeks). The Student's t-test was applied and the p-value was 0.792. Since the p-value is greater than 0.05, the difference in mean POG between the two groups is not statistically significant. Indicates the group is homogenous in relation to POG also.

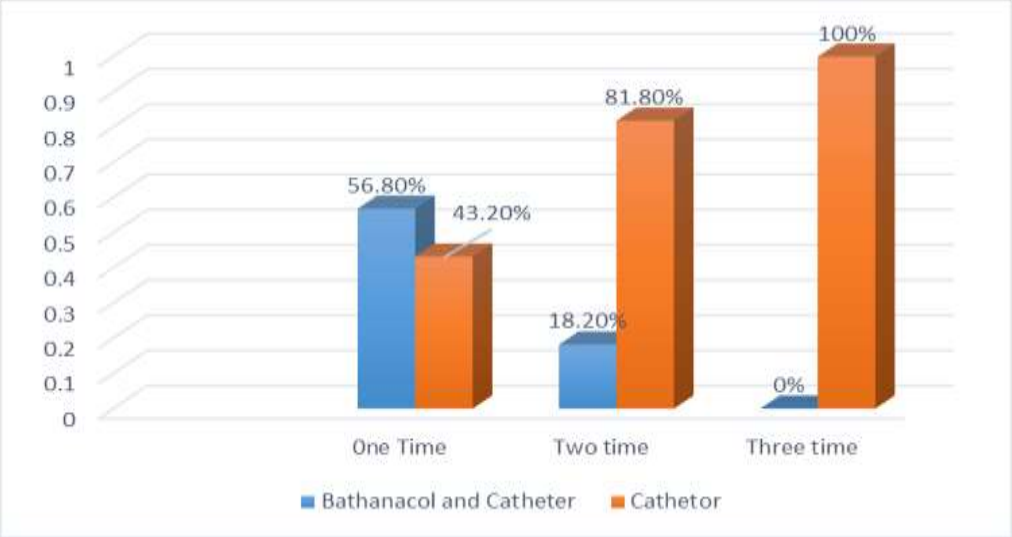
Birth weight of the baby	**Table 9: Difference of mean Birth weight of babies born between both the groups**							
	Group	**N**	**Mean**	**Median**	**SD**	**SE**	**Student t Test**	**P-value**
	Bethanecol and Catheter	23	3.22	3.13	0.344	0.0716	-1.27	**0.21 Not significant**
	Catheter	26	3.34	3.32	0.327	0.064		

This table compares the mean birth weight of babies born between the two groups using the Student's t-test. The mean birth weight for the "Bethanecol and Catheter" group was 3.22 kgs (median 3.13 kgs, SD 0.344 kgs) and for the "Catheter" group was 3.34 kgs (median 3.32 kgs, SD 0.327 kgs). The Student's t-test value was -1.27 and the p-value was 0.21. Since the p-value is

greater than 0.05, the difference in mean birth weight between the two groups is not statistically significant. This is another parameter proves groups are well matched and which reduces the selection bias.

Table 10: Number of time catheterization required in different treatment group										
Mode of treatment	**Number of times catheterization required**								**Chi-square test (Fisher exact)**	**P- value**
	One		**Two**		**Three**		**Total**			
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**		
Bethanecol and Catheter	21	56.8 %	2	18.2 %	0	0.0 %	23	46.9 %	15.1	**0.027 (Significant with P-value is less than 0.05)**
Catheter	16	43.2 %	9	81.8 %	1	100.0 %	26	53.1 %		
Total	37	100.0 %	11	100.0 %	1	100.0 %	49	100.0 %		

Picture 4: Number of time catheterization required in different treatment group

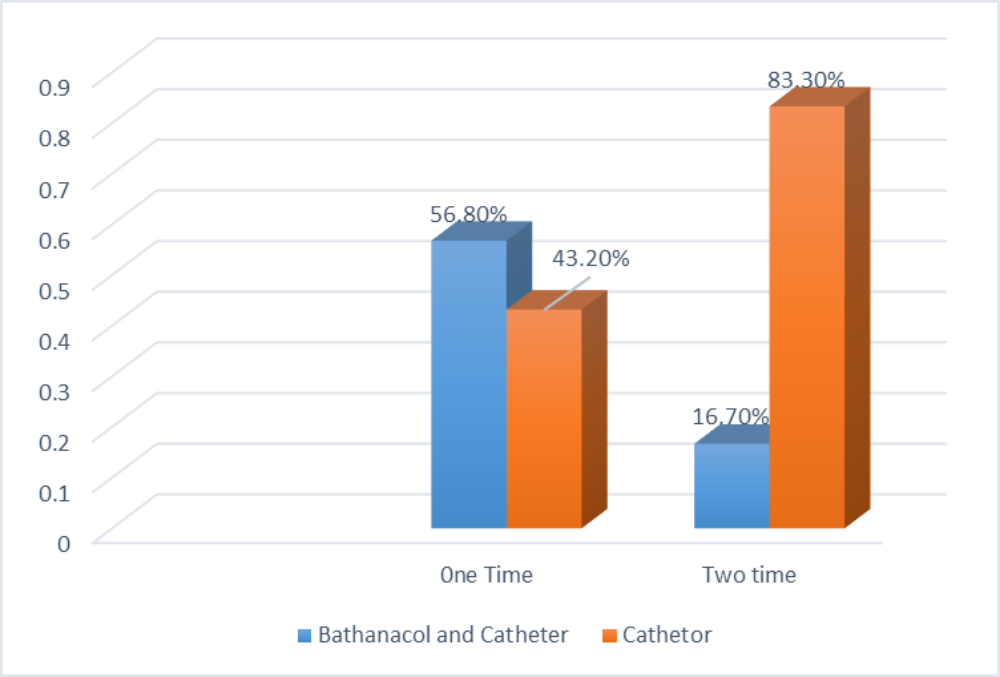


The above table and picture shows the number of times catheterization was required in each treatment group. The data is presented as counts and percentages. In the "Bethanecol and Catheter" group, 21 participants (56.8%) required catheterization once, 2 participants (18.2%) required it twice, and none required it thrice. In the "Catheter" group, 16 participants (43.2%) required catheterization once, 9 participants (81.8%) required it twice, and 1 participant (100%) required it thrice. The Chi-square test (Fisher's exact) was used to assess the difference between the groups, and the ***p-value of 0.027 suggests a statistically significant difference*** in the number of times catheterization was required between the two groups.

The data clearly shows that a higher proportion of participants in the "Catheter" group (81.8%) required catheterization two times compared to the "Bethanecol and Catheter" group (18.20%). The catheter alone group needed even catheterization for the third time, whereas the Bethanecol& catheter group was needed the same. Overall, the results suggest that participants in the "Catheter" group tended to require catheterization more frequently compared to those in the "Bethanecol and Catheter" group.

Table 11: Number of time catheterization required in different treatment group							**Chi-square test**	**P- value**
Mode of treatment	**Number of times catheterization required**							
	One		**Two**		**Total**			
	N	**%**	**N**	**%**	**N**	**%**		
Bethanecol and Catheter	21	56.8 %	2	16.7 %	23	46.9 %	5.85	**0.016 (Significant with P-value is less than 0.05)**
Catheter	16	43.2 %	10	83.3 %	26	53.1 %		
Total	37	100.0 %	12	100.0 %	49	100.0 %		

Picture 5: Number of time catheterization required in different treatment group



The information on the number of times catheterization was required for each treatment group, categorized as one time, two times, and the total number of participants requiring catheterization. In the "Bethanecol and Catheter" group, 21 participants (56.8%) required catheterization once, while 2 participants (16.7%) required it twice, totaling 23 participants (46.9%) from this group. On the other hand, in the "Catheter" group, 16 participants (43.2%) required catheterization once, and 10 participants (83.3%) required it twice, with a total of 26 participants (53.1%) from this group requiring catheterization.

To assess if there was a statistically significant difference between the two treatment groups in the number of times catheterization was required, the Chi-square test was employed. The p-value was 0.016. Since the p-value of 0.016 is *less than the significance level of 0.05*, it can be concluded that there is a *statistically significant difference between the "Bethanecol and Catheter" group and the "Catheter" group in terms of the number of times catheterization* was required.

The data clearly shows that a higher proportion of participants in the "Catheter" group (83.3%) required catheterization two times compared to the "Bethanecol and Catheter" group (16.7%). Overall, the results suggest that participants in the "Catheter" group tended to require catheterization more frequently compared to those in the "Bethanecol and Catheter" group.

Discussion

Postpartum urinary retention is reported in the literature with incidences ranging between 0.45 to 14.1 %. From our study , we found PUR as a common occurrence with incidence of 3.8 %.

Shivani gaitonde et al did descriptive analysis in2019 with use of Bethanechol in elderly women for bladder atony. They found out of total clinic visit 0.8% women still prescribed Bethanechol with most common indication of bladder atony followed by urinary retention. Our study also showed usage of Bethanechol being used for acontractile bladder following parturition.

D M Barrette conducted randomized controlled double blind study with Bethanechol vs placebo in female with significant residual urine volume. They observed no significant difference between both group in terms of reducing residual volume, percentage residual volume, mean flow rate and intravesical pressure at 100 ml. volume and at maximal capacity. However we observed in study significant amount of reduction in requirement of catheterization in post partum urinary retention.

Riedl C et al conducted randomized, double blind controlled trail with usage of Bethanechol in acontractile bladder and found Bethanechol showed a significant reduction of residual volume and

an increase of maximal urinary flow compared to placebo ($p < 0.02$ and $p < 0.03$). Furthermore, Bethanechol exhibited a strong tendency to increase the maximal detrusor pressure (p values close to 5 %). Study finding was in correlation with our study which also shows significant reduction in residual volume and henceforth requirement of invasive intervention for postpartum urinary retention.

Strength of our study was that it was retrospective study, hence chances for bias towards monitoring and follow up was reduced. We have included patient various ethnicities across country. Limitation of our study includes insufficient sample size. We need large sample size for more accurate study analysis.

Conclusion

Postpartum urinary retention is a very common condition, which is associated with the labor process. Bethanechol was found be effective in reducing the requirement of re-catheterization in PUR. Also Bethanechol is effective especially in the early phases of PUR. Thus, it is important to institute treatment with Bethanechol in cases of complete or partial urinary retention.

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