

**“POSTPARTUM URINARY RETENTION AFTER VAGINAL
DELIVERY – ASSESSMENT OF OBSTETRIC RISK
FACTORS”**

Dissertation Submitted To

THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY

In partial fulfillment of the regulations

For the award of the degree of

M.S.DEGREE BRANCH-II

OBSTETRICS AND GYNAECOLOGY



MADRAS MEDICAL COLLEGE

THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY

CHENNAI-600 032, TAMILNADU

MAY 2019

BONAFIDE CERTIFICATE

This is to certify that the dissertation titled “**POSTPARTUM URINARY RETENTION AFTER VAGINAL DELIVERY – ASSESSMENT OF OBSTETRIC RISK FACTORS**” is the original work done by **Dr.S.SUGANYA**, postgraduate in the Department of Obstetrics and Gynaecology, Madras Medical College, Chennai to be submitted to The Tamilnadu Dr.M.G.R. Medical University, Chennai-600032, towards the partial fulfillment of the requirement for the award of M.S. Degree in Obstetrics and Gynaecology, May 2019. The period of study is from March 2017 to February 2018.

DR.R.JAYANTHI M.D.,

DR.S.VIJAYA,M.D.,D.G.O.,

Dean

Director I/C

Madras Medical College,
Rajiv Gandhi Government
General Hospital,
Chennai 600 003

Institute of Social Obstetrics Government
Kasturba Gandhi Hospital
Chennai - 600005

DECLARATION

I, **Dr.S. SUGANYA**, Post Graduate, Department of Obstetrics and Gynaecology, Madras Medical College, solemnly declare that the dissertation titled **“POSTPARTUM URINARY RETENTION AFTER VAGINAL DELIVERY – ASSESSMENT OF OBSTETRIC RISK FACTORS”** is the bonafide work done by me at Department of Obstetrics and Gynaecology, Madras Medical College under the expert guidance and supervision of **Dr.PREMA ELIZABETH, M.D., DGO.**, Professor, Institute of Obstetrics and Gynaecology, Madras Medical College. The dissertation is submitted to the Tamil Nadu Dr.M.G.R Medical University towards partial fulfillment of requirement for the award of M..S., Degree (Branch II) in Obstetrics and Gynaecology.

Place: Chennai

Date:

Dr. S. SUGANYA

Signature of the Guide

Dr.PREMA ELIZABETH, M.D., DGO.,

Professor,

Institute of Obstetrics and Gynaecology

ACKNOWLEDGEMENT

I am thankful to the Dean, Dr.R.JAYANTHI M.D., Madras Medical College, Chennai for allowing to use the facilities and clinical materials available in the hospital.

It is my pleasure to express my thanks to Prof. Dr. VIJAYA MD.,D.G.O., Director, Institute of Social Obstetrics Government Kasturiba Gandhi Hospital for her valuable guidance, interest and encouragement in this study.

I take this opportunity to express my deep sense of gratitude and humble regards to my beloved teacher Dr. PREMA ELIZABETH M.D., D.G.O., for her timely guidance suggestions and constant inspiration enabled me to complete this dissertation.

I thank all my Professors, Assistant Professors and paramedical Staffs of this Institute and Institute of Obstetrics and Gynaceology, Egmore.

I thank all my patients for their cooperation and hence for the success of study.

I thank my family and friends for their inspiration and support given to me.

CONTENTS

1. INTRODUCTION	1
2. AIMS OF STUDY	4
3. REVIEW OF LITERATURE	5
4. MATERIALS AND METHODS	29
5. RESULTS	33
6. DISCUSSION	63
7. CONCLUSION	74
8. BIBLOGRAPHY	76
9. APPENDICES	80

INTRODUCTION

Post partum urinary retention (PUR) is an upsetting condition that has no standard literature definition. In literature, the incidence of PPUR varies widely, but the estimated incidence is likely to be more, since most cases often remain unseen. Early detection of the condition helps to avoid patient distress and it facilitates early treatment. Its pathophysiology, however is poorly understood. Although has uncertain pathophysiology, there are several hypotheses on the cause of PPUR. Vaginal delivery can be traumatic for pelvic floor muscles and the nerves supplying the perineum, which will cause reduced bladder sensitivity. Also, periurethral and vulvar edema due to vaginal delivery may result in obstruction. Pregnancy-associated physiological changes, regional analgesia, instrument assisted delivery, birth canal injury, nulliparity and prolonged labour have all been postulated as causes of post partum urinary retention in women who deliver vaginally.

Postpartum voiding dysfunction is defined as having difficulty in complete micturition leading to urine retention or inability to micturate spontaneously after birth.

According to the RCOG Incontinence in Women Study Group, every post delivery women should void within 6 hrs, if not catheterisation should be performed also both the NICE guideline on postnatal care and the WHO Technical consultation on postpartum and postnatal care state that if there is no voiding within 6 hrs of birth and the struggle of voiding is not successful, the bladder volume should be assessed, and catheterisation should be considered. there is no standard definition of postpartum urinary retention. Common symptom based definition is “ The absence of spontaneous micturition after 6 hours of vaginal delivery” OR “ No spontaneous micturition within 6 hours of the removal of indwelling catheter after LSCS.

Post partum urinary retention has been classified into covert and overt retention by Yip et al. Women with post void residual bladder volume (PVRBV) of > 150ml detected by ultrasound scanning or by catheterization without symptoms of urinary retention are classified as covert retention.

Women who are unable to void spontaneously within 6 hrs of delivery with signs and symptoms of urinary retention are categorised as overt retention.

Traditionally, post void residual bladder volume is measured by passing a urethral catheter to empty the bladder, but this usually

causes discomfort for the patient and poses a risk of infection or trauma.

Ultra sound is a non- invasive method to detect the postvoid residual volume, which is readily available in most obstetric units to detect urinary retention.

The most commonly used volume found to be > 150ml can be used for the purpose of comparison in published data, and research purpose.

Ultrasound has been shown to be accurate and reproducible in diagnosing post partum urinary retention .However, it is found to be labour intensive.

Screening for PPUR is not an integral part of postnatal care, therefore identifying the risk factors and early diagnosis are very much important in preventing permanent damage to bladder.

In this study, the maternal, fetal and obstetric factors which were related to postpartum urinary retention were studied.

AIMS OF THE STUDY

1. To detect the incidence of post partum urinary retention, (covert and overt), after vaginal delivery.
2. To determine the obstetric risk factors contributing to post partum urinary retention.

REVIEW OF LITERATURE DEFINITION

Postpartum urinary retention is an upsetting condition that has no standard definition .it has been variedly defined as the abrupt onset of aching or achless inability to completely micturate, requiring urinary catheterisation, over 12 hr after giving birth or not to void spontaneously within 6 hrs of vaginal delivery. In 2001, Calgary Health Region 's policy and procedures outlined acute urinary retention as the catheterisation of bladder within first 24 hrs of postpartum for not voiding within 6 hrs of postpartum, to micturate often in small amounts, or to have an urge to micturate but cannot or to be catheterised for any reason for an amount of 500 ml output within the first 24 hrs postpartum. A functional definition is the inability to void spontaneously within 6 hours of vaginal delivery, or within 6 hours of the removal of a urinary catheter after caesarean section. Another definition is based on postvoid residual volume, as assessed by abdominal ultrasound or bladder catheterization. The definition of an abnormal post partum postvoid residual remains controversial, with the upper threshold varying from 50 to 200 ml. however ,in the literature, the estimated incidence of PPUR varies between 0.05% and 37%.

Post partum urinary retention (PPUR) can be clinically divided to covert retention and overt retention. Overt retention is symptomatic and characterized by the inability to void spontaneously within 6 hrs of delivery, accompanied by pain and discomfort. Covert post partum urinary retention refers to the asymptomatic women who are unable to empty their bladders completely, and are detected only by ultrasound or catheterization, as post void residual volume.

Pathophysiology of Post partum urinary retention

The pathophysiology of post partum urinary retention is still unclear. The most probable causes may be grouped into,

1. Physiological changes in the bladder and urinary tract during pregnancy, child birth, and puerperium.

2. Neurogenic damage to the bladder during childbirth.

3. Local trauma to the lower urinary tract and perineum at childbirth.

1. Physiological changes in the bladder occurring during pregnancy and post partum period increases the risk of urinary retention. Both structural and functional changes occur in the urinary tract during both delivery and puerperium. These changes may be

specific in response to pregnancy, and in some women may be associated with pathological causes. Hydronephrosis and hydroureter is a common thing noted in approximately 90% of patients in the third trimester. It is more on the right side, as compared to the left, probably due to the dextro-rotation of the uterus. The bladder is drawn upwards and anteriorly as the uterus enlarges resulting in lengthening of the urethra. Starting in the third month of pregnancy, bladder muscle tone is reduced, with capacity slowly increasing until the eighth month of gestation. Muellner et al, reported an increase in bladder capacity by an average of 130ml in the third trimester.

Progesterone, which has an inhibitory effect on the contraction of the bladder smooth muscle, is found to be the reason in pregnancy. As a result, the first desire to void and urge to void in pregnant women differs from that of non pregnant women. Pregnant women ordinarily have the first desire to void with 250–400 ml of urine, and maximum urinary urge often is seen with the bladder volume 1000–1200 ml in the supine position. When the pregnant woman stands up the enlarged uterus exerts pressure on the bladder. This leads to increased frequency of urine indicating a reduction in bladder capacity at that time. This disappears once the baby has been

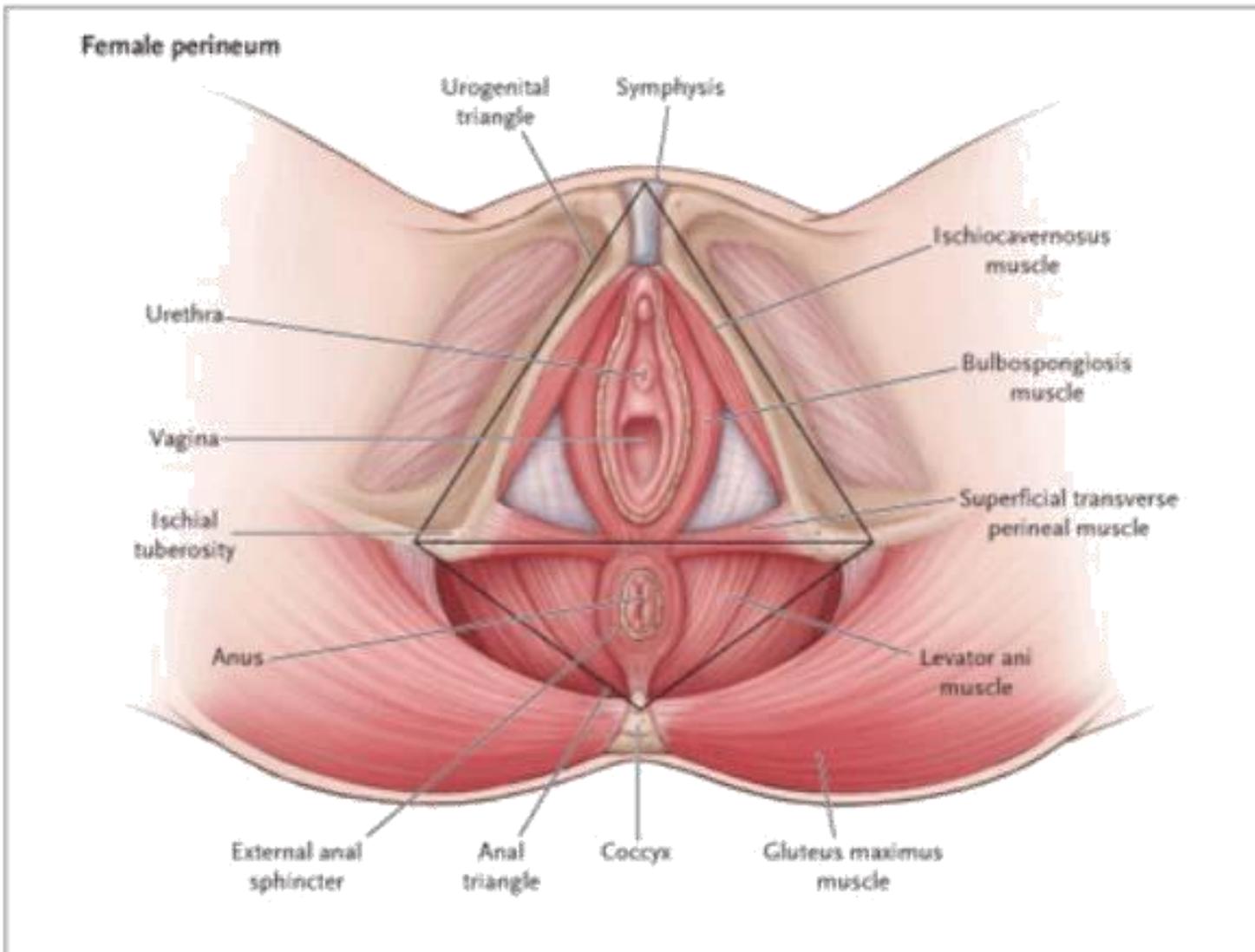
delivered.

The urethral mucosa becomes more hyperemic and congested in pregnancy in response to the increasing estrogen levels. The detrusor muscle also hypertrophies in response to oestrogen .

After delivery cystoscopy shows changes such as mucosal congestion, submucosal haemorrhage and capillary oozing, especially around the bladder neck, trigone and urethral orifices. These changes have been associated with a decrease in bladder sensation and tone, which may cause urinary retention. This is more marked in women who undergo vaginal delivery.

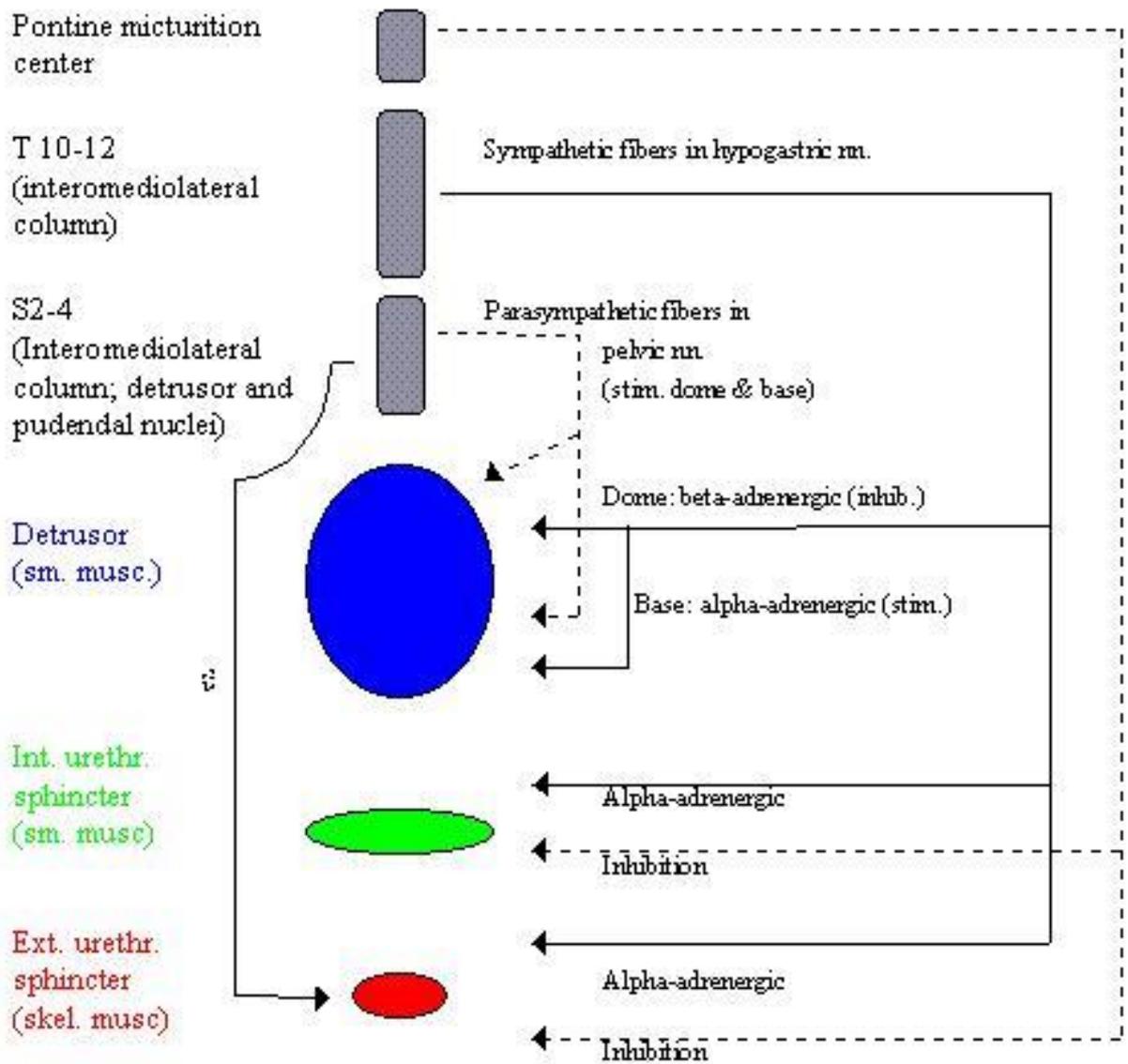
2. Neurologic damage to the nerves supplying the bladder and lower urinary tract occur during delivery due to stretching of the pelvic floor muscles, assisted, instrumental delivery or epidural analgesia.

During vaginal delivery the distention of pelvic floor by the fetal head and by pressure of maternal expulsive efforts, stretch the pelvic floor and lead to functional and anatomical alterations in the muscles, and nerves supplying the lower urinary tract. This can lead to postpartum retention.



PELVIC FLOOR

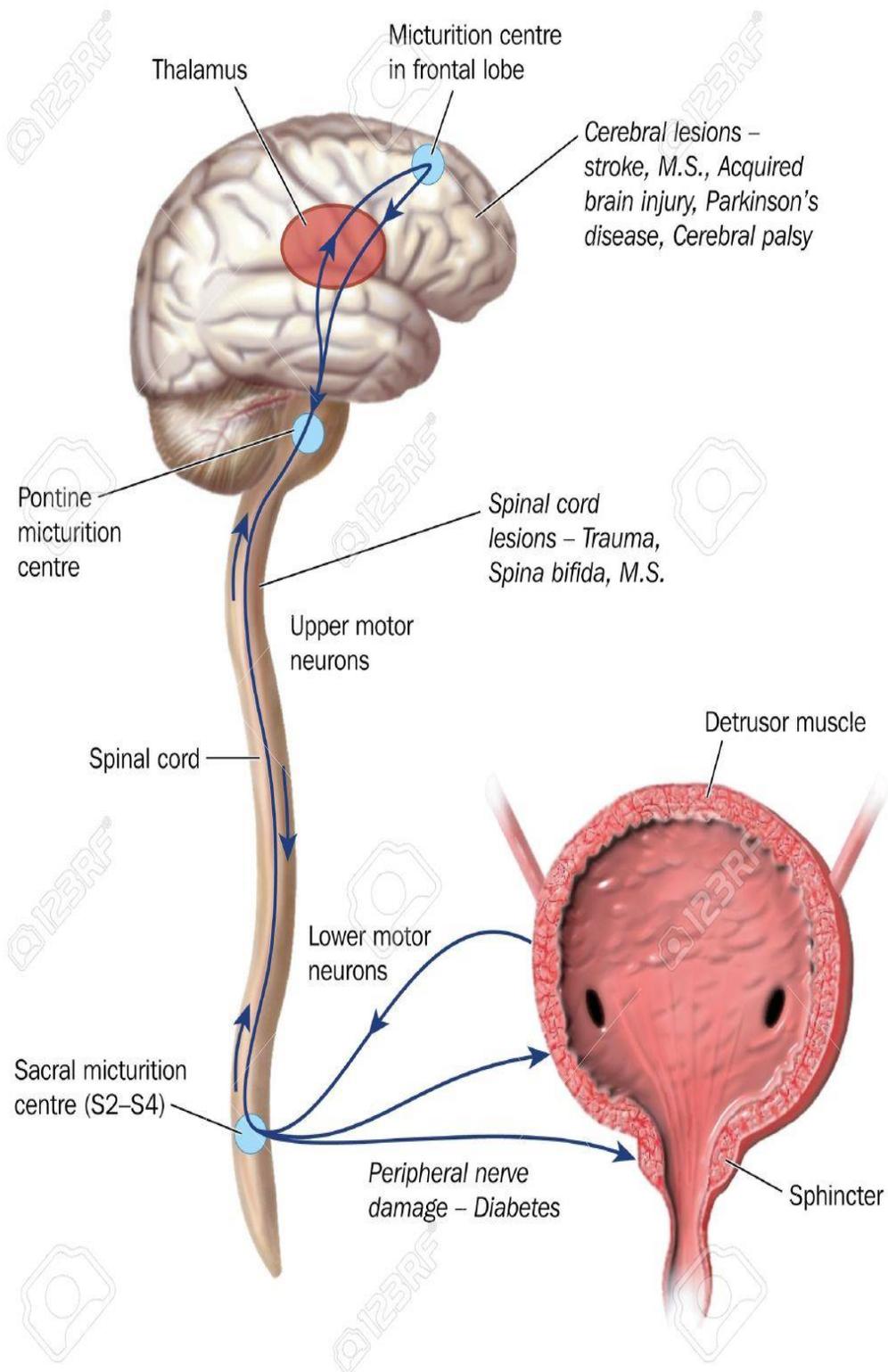
NEUROLOGICAL PATHWAY TO BLADDER AND LOWER URINARY TRACT



The above picture demonstrates the neurological pathway to the bladder and lower urinary tract. Any neurologic derangement from cortex to pons, cord, & peripheral nerves can result in urinary retention, incontinence, or a combination of both. Both instrument delivery and regional analgesia result in urinary retention, based on the neurologic impairment of micturition. In normal micturition, afferent input arises from bladder stretch receptors that travel through myelinated A delta fibres in the pelvic nerve to the spinal cord and pontine micturition centre. Efferent signals mediate relaxation of the urethral and periurethral striated muscles and pelvic floor through the pudendal and sacral nerves; detrusor muscle contraction and urethral smooth muscle relaxation are mediated by the pelvic nerve and parasympathetic outflow. It is likely that the post partum urinary retention that is observed after regional analgesia is due to temporary disruption of afferent input and that the urinary retention because of instrument assisted delivery, is related to impaired reflex and voluntary relaxation of the sphincter urethrae, periurethral muscles and pelvic floor, due to damage to the peripheral nerves (peripheral neuropathy).

In addition to having neurologic effects, instrument assisted delivery may result in mechanical outlet obstruction, as a consequence of perineal oedema, or it may cause direct bladder trauma.

3. Local trauma to the soft tissues and urethra during vaginal delivery may cause oedema and pain and which in turn lead to inability to micturate post partum, leading to post partum urinary retention.



NEUROPHYSIOLOGY OF MICTURITION

Normal voiding is accomplished by activation of the micturition reflex. The micturition reflex is a bladder to bladder contraction reflex for which the reflex centre is located in the rostral pontine tegmentum. There are two afferent pathways from the bladder to the brain. One is the dorsal system and the other is the spinothalamic tract. Afferents to the PMC ascend in the spinothalamic tract, which run through the lateral funiculus of the spinal cord. The efferent pathway from the PMC also runs through the lateral funiculus of the spinal cord to inhibit the thoracolumbar sympathetic nucleus and the sacral pudendal nerve nucleus, while promoting the activity of the sacral parasympathetic nucleus. Inhibition of sympathetic nucleus induces relaxation of the bladder neck and the external urethral sphincter respectively. There are two centres which inhibit micturition in the pons, which are pontine urine storage centre and the rostral pontine reticular formation. In the lumbosacral cord, excitatory glutaminergic and inhibitory glycinergic/GABAergic neurons influence both the afferent and efferent limbs of micturition reflex. The activity of these neurons is affected by the pontine activity. The brain has the overall inhibitory effect on micturition and thus maintains continence.

Storage and evacuation of urine depends on neural integration at the peripheral, spinal cord, and central levels. Normally, bladder distention cause low level firing of afferent nerves, which cause reflex inhibitory response to the bladder via the hypogastric nerve and stimulatory response to the external sphincter from the pudendal nerve. With further distention, myelinated A delta fibre afferents are activated. Afferents travel up the spinal cord to the pontine micturition centre. Here the central input, mostly inhibitory, is received from supra pontine centres. If voiding is not desired, the voiding reflex can be inhibited. If voiding is desired, efferent output to the pelvic plexus at S2- S4 via the spinal cord can be initiated. Ultimately, the stimulatory message is sent to the bladder via the pelvic nerve. At the same time, inhibitory messages are sent to the hypogastric and pudendal pathways to allow relaxation of the sphincter in mechanisms and promote voiding.

INCIDENCE:

The reported incidence of postpartum urinary retention varies due to differences in the definitions and the method of diagnosis. Overt urinary retention incidence ranges from 0.45%(Carley et al,2002),1.7% to 17.9% (saultz et al,1991)and from 0.05% to 37%(Lim ,2010) have been reported. Incidence of covert urinary retention range from 9.7%(Yip et al,1997) to 37%(ismail & emery 2008).however if the postvoid residuals

are not measured it is not possible to identify these women.(Carley et al,2002).As a result, the actual incidence may be higher than reported.

ASSOCIATED RISK FACTORS FOR POST PARTUM URINARY RETENTION

Post partum urinary retention has been associated with a number of risk factors like age, nulliparity, birth weight, caesarean section, instrument assisted delivery (forceps/vaccum), prolonged first and second stages of labour, epidural anaesthesia, episiotomy, perineal trauma .

AGE

Several retrospective and prospective case controlled studies have shown that age is not significantly associated with post partum urinary retention

Study	Age (mean)	p value
Liang et al ,2002	Case 29.3 control 30.6	NS
Roderick et al,2007	Case 29 control 28	0.26 (NS)
Carley et al ,2002	Case 28.1 control 28.9	0 .247 (NS)
Yip et al, 2005	Gr A 28 Gr B 29	0.25 (NS)

An observational prospective study by Liang et al, to assess the contributing factors and long term impacts of post partum urinary retention, included a total of 2866 women, who delivered vaginally. 114 women were classified as urinary retention group and the remaining 2752 women categorized as control group. Women in the urinary retention group and control groups did not differ significantly in terms of age, fetal head circumference or fetal birth weight.

The study by Roderick et al, was a retrospective case control study to determine the incidence of overt post partum urinary retention after vaginal delivery and to establish associated risk factors. They included 15,757 deliveries from 2001- 2005. There were 30 cases of overt post partum retention, (0.2 %)

There were 120 time matched controls. As shown in the table above the mean age of patients with post partum retention was 29 (range 26- 32) years, versus 28 (range 23- 32) years, which was not statistically significant on univariate analysis. Fetal birth weight was also not significantly associated with post partum urinary retention.

In the retrospective case control study by M. Carley et al ,including 11,332 vaginal deliveries, there were 51 (0.45%) women who had overt post partum retention. There were 150 controls.

On statistical analysis the mean age of patients with post partum urinary retention was 28.1 years as against 28.9 years for patients without retention, which was not significant ($p = 0.247$).

Yip et al screened patients for post partum urinary retention, using duration of labour as a predictive factor. A total of 691 patients were recruited, out of which 101 (14.6%) had post partum urinary retention. The patients were computer randomized into two groups, with 346 patients in Group A and 345 patients in Group B. For the 101 patients with post partum urinary retention, 51 were in group A and 50 in Group B. There were no difference in between the two groups in terms of age or birth weight. The mean age of the patients with post partum urinary retention was 28 years (range 25-32), as compared to 29 (range 25- 33) years which was not statistically significant ($p = 0.25$).

BIRTH WEIGHT

Several studies have shown that birth weight is not significantly associated with post partum urinary retention.

Study	Mean Birth Weight (kg)	p value
Liang et al ,2002	Case 3.1 control 3.09	NS
Roderick et al ,2007	3.35 3.34	0.38 (NS)
Carley et al 2002	3.50 3.36	0.191 (NS)
Yip et al ,2005	GrA 3.2 Gr B 3.2	0.73 (NS)

The above table demonstrates the relationship of fetal birth weight and post partum urinary retention as calculated from various studies.

An observational prospective study by Liang et al, to assess the risk factors and long term impacts of post partum urinary retention, included a total of 2866 women, delivered vaginally. 114 women were classified as urinary retention group and the remaining 2752 women categorized as control group. Women in the urinary retention group and control groups did not differ significantly in terms of fetal head circumference or fetal birth weight..The mean birth weight in patients with retention was 3.10 kg as compared to 3.09 kg in patients without urinary retention, which was not significant .

A retrospective case control study was done by Roderick et al to determine the incidence of overt post partum urinary retention after vaginal delivery and to establish associated risk factors. It included 15,757 deliveries from 2001- 2005. There were 30 cases of overt post partum retention, (0.2%). There were 120 time matched controls. The mean fetal birth weight in the overt PUR group (n = 30) was 3.35kg. The mean birth weight in the control group (n = 120) was 3.34 kg . This relationship was not significant, $p = 0.38$.

In the retrospective case control study by M. Carley et al ,including 11,332 vaginal deliveries, there were 51 (0.45%) women who had overt post partum retention. There were 150 controls. Fetal birth weight was not associated with overt post partum urinary retention.

The mean birth weight of patients with retention was 3.50 kg as opposed to 3.36kg in patients without retention, $p = 0.191$, NS.(4).

Yip et al screened patients for post partum urinary retention, using duration of labour as a predictive factor. A total of 691 patients were recruited, out of which 101 (14.6%) had post partum urinary retention. The patients were computer randomized into two groups, with 346 patients in Group A and 345 patients in Group B. For the 101 patients with post partum urinary retention, 51 were in group A and 50 in Group B. The mean fetal birth weight in both groups was 3200gms, $p = 0.73$,NS.

PARITY

Kerman et al, demonstrated that primiparas were more associated with postpartum urinary retention. His findings were later on supplemented by others in prospective and retrospective studies stating that primiparity was significantly associated with post partum retention, by univariate analysis. In the largest retrospective case controlled study, conducted from April 1992-April 2000, nulliparity was significantly associated with retention ($p < 0.001$) on univariate analysis. But on multivariate analysis, with other obstetric variables it was seen that primiparity was no longer significantly associated with urinary retention.

Primiparity is more likely associated with episiotomy and instrument assisted delivery and hence has increased chance of urinary retention.

INSTRUMENTAL DELIVERY

Several studies have shown that instrumental delivery is significantly associated with post partum vaginal delivery.($p < 0.001$) by univariate analysis.

On multivariate regression analysis with other variables, instrumental delivery was significantly associated with post partum urinary retention. Instrumental delivery increases the risk of injury to the pelvic floor and nerves.

Also, the incidence of perineal trauma and urethral and bladder injuries are increased and hence increases the chances of post partum urinary retention.

DURATION OF LABOUR

Duration of labour in this study was defined as the combination of both first and second stages of labour, as the two stages are a physiological continuum rather than two separate events. Both stages of labour would have contributed significantly to the occurrence of post

partum urinary retention and pelvic floor damage . Therefore, the duration of labour in this study is taken as the interval between the onset of cervical dilatation associated with painful uterine contractions to the full expulsion of the fetus .

It has been shown that both first stage and second stage of labour is significantly associated with post partum urinary retention. In a study by Yip et al (5),it has been shown that duration of labour > 800min was the only obstetric variable associated with post partum urinary retention, $p > 0.001$.

The other obstetric variables like parity, mode of delivery, birth canal trauma, Epidural anaesthesia, and episiotomy have been shown to be confounding variable in the multivariate regression analysis.

Yip et al, presented a hypothesis that during protracted labour, the presenting part of the fetus may exert pressure on the pelvic floor and the pelvic soft tissues including the pelvic nerve plexus, which may subsequently lead to either urinary outflow obstruction by oedema, or detrusor dysfunction due to neurapraxia. Duration of labour has been shown to be significantly associated with post partum urinary retention in several studies, both by univariate and multivariate logistic regression,while the other obstetric variables like, parity, age, birth weight, birth canal injury and episiotomy have been shown to be

confounding variables in most of the studies.

EPISIOTOMY

Episiotomy has been shown to be associated with more cases of post partum urinary retention in the univariate analysis but not by multivariate analysis by several studies . The retrospective case control study done by M. Carley et al, stated that mediolateral episiotomy was significantly associated with PUR($p < 0.001$) on multivariate logistic regression analysis.

EPIDURAL ANAESTHESIA

Epidural analgesia predisposes to post partum urinary retention by suppressing sensory impulses from the bladder, thus inhibiting the reflex mechanism of normal micturition . An early cystometric study of the effect of lumbar epidural analgesia on the lower urinary tract in a group of nulliparous women after vaginal delivery showed that women who had epidural analgesia had a higher prevalence of hypotonic bladders than women without epidural.Kerman et al, showed that the use of lumbar epidural analgesia among other obstetric variables was significantly more frequent in women with post partum urinary retention (4 vs 1%).Olofsson et al also reported a significant increase in the incidence of post partum urinary retention in women with an epidural

compared to those without.(2.7 vs 0.1%).However, neither study had controlled for confounding variables. M. Carley, in his large retrospective study of factors associated with clinically overt post partum urinary retention, showed that epidural analgesia was significantly associated with post partum urinary retention by univariate analysis ($p < 0.001$).

On multivariate regression analysis of all confounding variables only epidural analgesia and instrumental delivery were found to be significant risk factors.

In a study conducted by F.E.M Mulder, 2016; episiotomy, epidural analgesia, and birth weight are independent risk factors for covert urinary retention.

POSTVOID RESIDUAL BLADDER VOLUME

Measurement of post void residual bladder volume is important in the assessment of voiding dysfunction. Traditionally,post void bladder volume is assessed by passing a urethral catheter to empty the bladder but this may be uncomfortable for the patient and poses a risk of urinary infection or urethral trauma.

Ultrasound is now being used to calculate the post void bladder volume. It is non invasive, and more patient acceptable.It has been

shown to be accurate and reproducible in diagnosing post partum urinary retention . Griffith et al used different formulas to calculate the bladder volume from ultrasonography. They demonstrated that with a suitable correction factor for improved accuracy, 90% of bladder volume can be measured to within $\pm 15\%$.For volumes less than 150 ml, errors might be larger.

A large number of definitions have been used by different authors for a cutoff for a significant post void bladder volume.PVRV>150 ml after the first void using a bladder scanner(Mulder et al,2016;Kekre et al,2011);PVRV>400ml measured by ultrasound within 3 hours of birth(Blomstrand,2015);PVRV>150 ml 6 hrs after birth(Buchanan and Beckmann,2014;sabricavkaytar et al,2014;Zakaria et al,2012;Chai et al,2008;Liang et al,2002);PVRV >150 ml or voided volume >500 ml 6 hrs postpartum(Ajenifuja et al 2013);PVRV >150 ml (Liang et al;2007);asymptomatic and PVRV>150 ml day 1 (Yip et al,2005b;1998,1997)PVRV>100 ml and uroflow <10 ml/sec and voided volume <150 ml (Ramsay and Torbet, 1993);PVRV >50 ml measured by ultrasound on day 1 and 2 (Chien et al,1996)PVRV >100 ml an day 2 (Weissman et al,1995).The most commonly used volume which was found to be ≥ 150 ml can be used for the purpose of comparison in published data and research purposes.

Furthermore, it was shown that following normal micturition a post void residual bladder volume of approximately 25% or greater of the normal adult physiological bladder capacity constituted a significant inability to empty the bladder and this was associated with detrusor failure and urinary retention in the long term. Given the normal female bladder usually holds 600-800ml of urine, post void residual bladder volume of 150-200ml can be used as a definition of urinary retention. As screening tests require greater sensitivity, a post void residual bladder volume of 150ml can be used for this purpose. We have used a cutoff of 150 ml as significant post void residual volume in this study.

MATERIALS AND METHODS

Research Design

This is a prospective study. A total of 100 women who delivered vaginally were recruited for this study.

Study setting

This study was conducted in the department of Obstetrics and gynaecology between March 2017 and February 2018. The study was approved by the ethics committee of the hospital.

Inclusion Criteria

1. Patients who had normal vaginal delivery.
2. Patients who had instrumental delivery.(Forceps and vaccum).

Exclusion criteria

1. Caesarean delivery
2. Patients with indwelling catheterization during labour.
3. Patients with indwelling catheterization after delivery for reasons other than acute urinary retention.
4. Unwilling to participate.

Sample Size - 100

Method

During the study period, all patients who delivered vaginally, were invited to participate. Each patient was explained the nature of the study. An informed consent was obtained from each patient. After vaginal (normal or instrumental) delivery the patients were kept in the labour ward till they voided spontaneously. All the recruited patients underwent a transabdominal scan to estimate post void residual bladder volume, within 15 minutes of voiding .The post void residual bladder volume was estimated by measuring the three diameters of the bladder and calculated using the formula for approximation of the ellipsoid .

$$\text{Volume} = (\text{pie} \times \text{D1} \times \text{D2} \times \text{D3}) / 6$$

D1 - widest diameter in the transverse scan(cm).

D2 - anteroposterior diameter in the longitudinal scan.(cm). D3 - cephalocaudal diameter in the longitudinal scan(cm).

$$\text{Pie} = 22/ 7.$$

All patients who had post void residual bladder volume \geq 150 ml were diagnosed to have post partum urinary retention. Patients

with post partum urinary retention were further subdivided into overt and covert post partum urinary retention groups. The diagnosis of overt post partum urinary retention was made, if there was increased bladder residual volume ≥ 150 ml, with symptoms of voiding difficulty like, straining, feeling of incomplete voiding and inability to void.

Covert post partum urinary retention was defined as postvoid residual bladder volume of ≥ 150 ml but without associated urinary symptoms.

If the patients did not void spontaneously after vaginal delivery, they were Encouraged for early ambulation, take a warm bath, listen to running water, or place hands in cold water .If they were still unable to void after 6 hours of vaginal delivery, a continuous bladder drainage catheter was inserted and kept in situ for 24 hours. The patients were then shifted to the post natal wards. All patients who had post void residual bladder volume > 150 ml were rescanned after the second void to check for post void residual volume.

If the patients developed symptomatic urinary retention in the ward, they were catheterised for 24 hours. After catheter removal, these patients were rescanned after voiding to check their post void bladder

volume.

Resolution of overt post partum urinary retention was defined by the ability to resume the spontaneous micturition and the post void bladder scan volumes < 150 ml. All patients with overt retention were contacted after 3 months to look for post void residual volume by ultrasound and for subjective assessment of symptoms like frequency, urgency, poor flow, hesitancy, stress incontinence or urge incontinence. Having compiled the obstetric data, analysis was done to compare the patients with and without post partum urinary retention, in terms of patient characteristics, obstetric parameters, including age, parity, perineal trauma, episiotomy ,mode of delivery, fetal birth weight, epidural analgesia, duration of labour in minutes.

Area under the ROC curve was estimated using duration of labour, and to choose an optimal cutoff point for diagnosis of post partum urinary retention.. A p value < 0.05 was considered statistically significant .

RESULTS

A total of 100 patients were recruited for the study.

The overall incidence of post partum urinary retention was found to be 12% (12 / 100) as shown in Table 1.

Table 1 POST PARTUM URINARY RETENTION

Post partum urinary retention	Frequency (n)	Percent
Absent	88	88
Present	12	12
Total	100	100.0

Table 2

COVERT AND OVERT POST PARTUM URINARY RETENTION

Post partum urinary Retention	Frequency (n)	Percent
Covert Retention	9	9
Overt retention	03	03
Total	12	12

Of the 100 women in the study 9% of patients had covert urinary retention

while 3% of women were diagnosed to have overt retention .

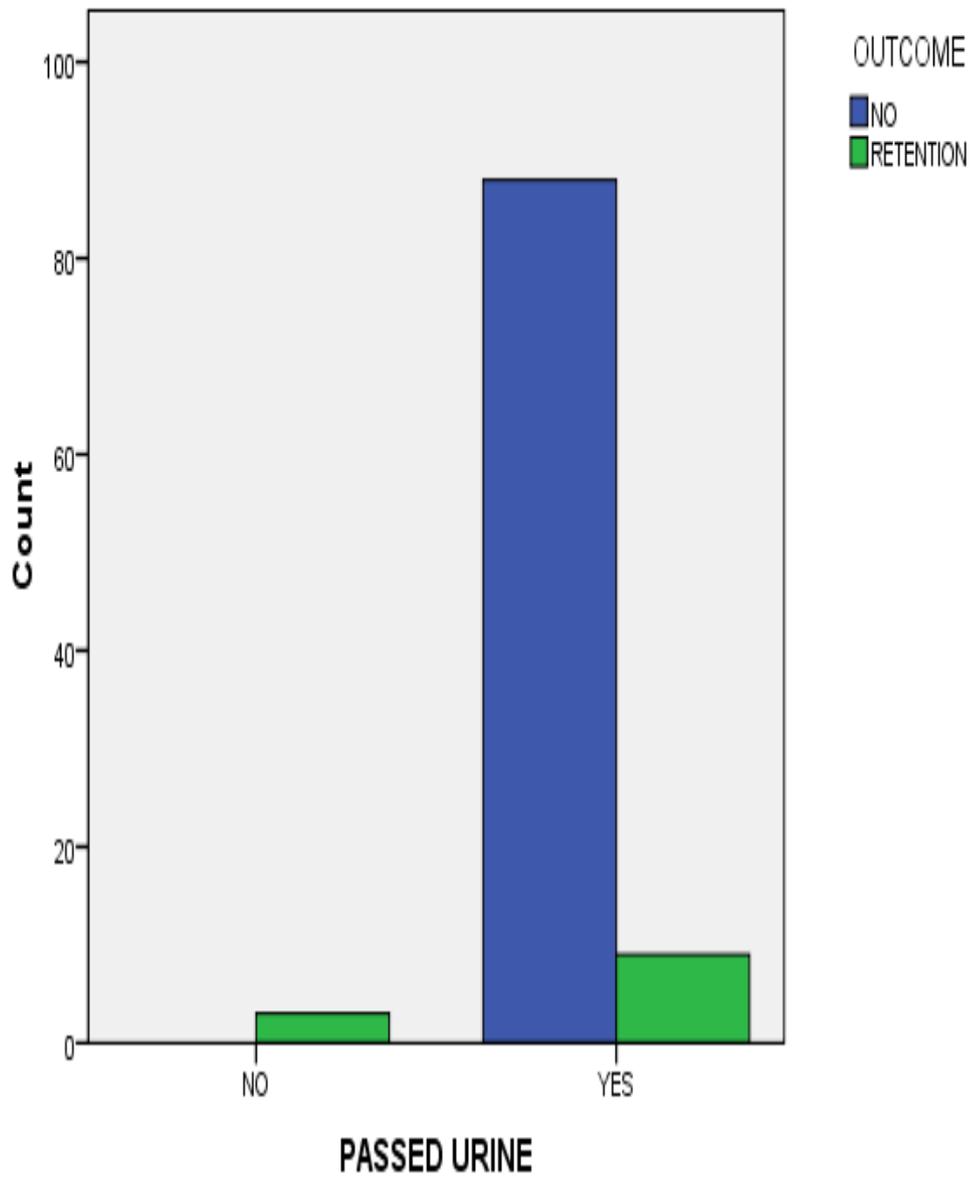


Table 3.

Comparison of various obstetric characteristics between the patients with post partum urinary retention and the patients without post partum urinary retention.

Variable	PUR (n = 12)	No PUR (n = 88)	P value*
Age ^a	23.5 ± 2.3	25.09 ± 3.02	0.084(NS)
Birth Weight ^a	3428.25 +_389.185	3039.47+_364.6 82	0.001 (S)
Parity ^b			
Primi	10	48	0.156 (NS)
Multi	02	40	
Mode of current delivery ^b			
Normal	0	81 (92%)	0.000(S)
Assisted	12 (100%)	7 (8%)	
Duration of labour ^a (min)	390.00±46.66	308.07±73.06	0.000(S)
Episiotomy ^b			
With	11(91.7%)	60 (68.2%)	0.093 (NS)
Without	1 (8.5%)	28 (31.8%)	
Birth canal injury ^b			
No	8(66.7%)	83 (94.3%)	0.002 (S)
Yes	4 (33.3%)	5 (5.7%)	
Mode of previous delivery ^b			
Normal	2 (16.7%)	40 (45.5%)	0.58 (NS)

a – continuous variables (age, birth weight, duration of labour - median (range) / mean \pm std deviation)

b – discrete variables (parity, mode of current delivery, episiotomy, birth canal injuries, mode of previous delivery – number(%))

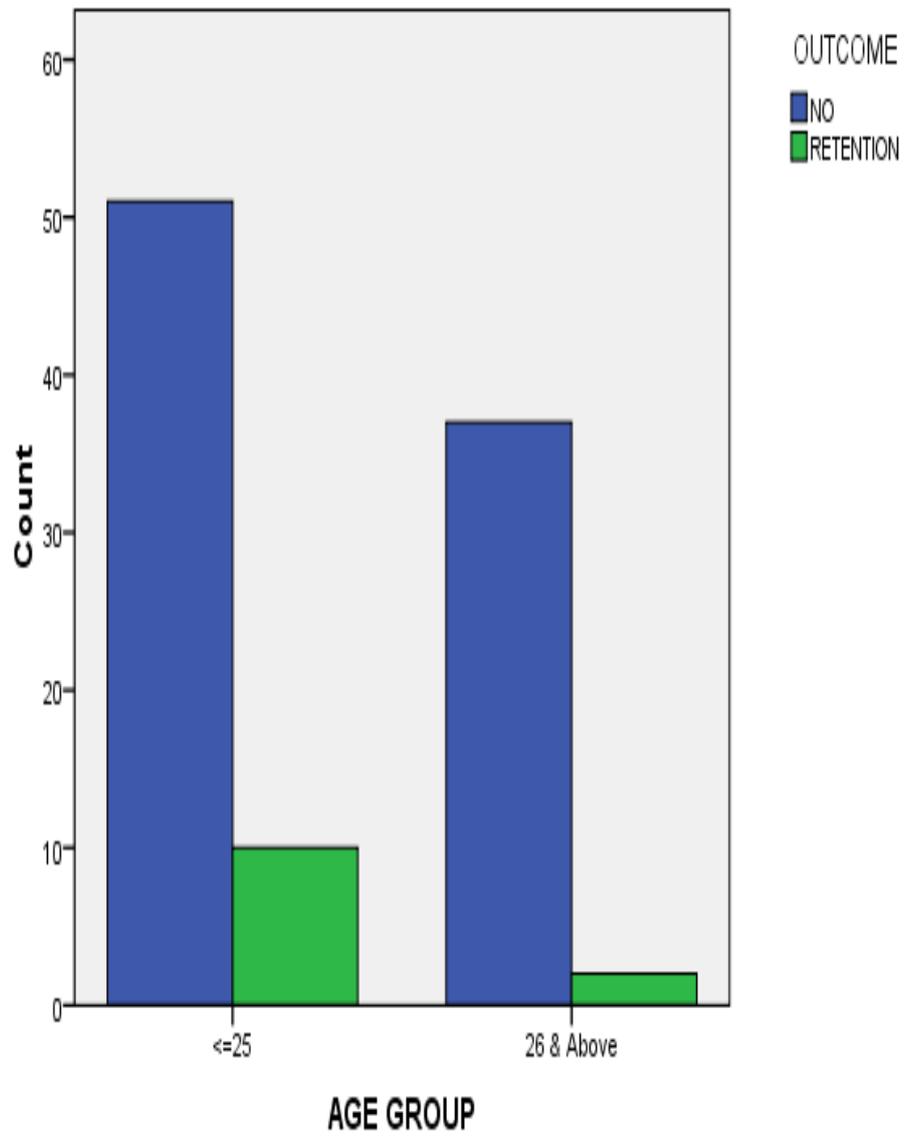
* - Pearson Chi square test for discrete variables and t- test for continuous variables.

Table 3 demonstrates the patient characteristics and obstetric variables associated with post partum urinary retention.

The mean age of the patients with post partum urinary retention was 23.50+_2.39 years compared to 25.09 + / - 3.02 years in those without urinary retention.(p = 0.084 NS)

Crosstab

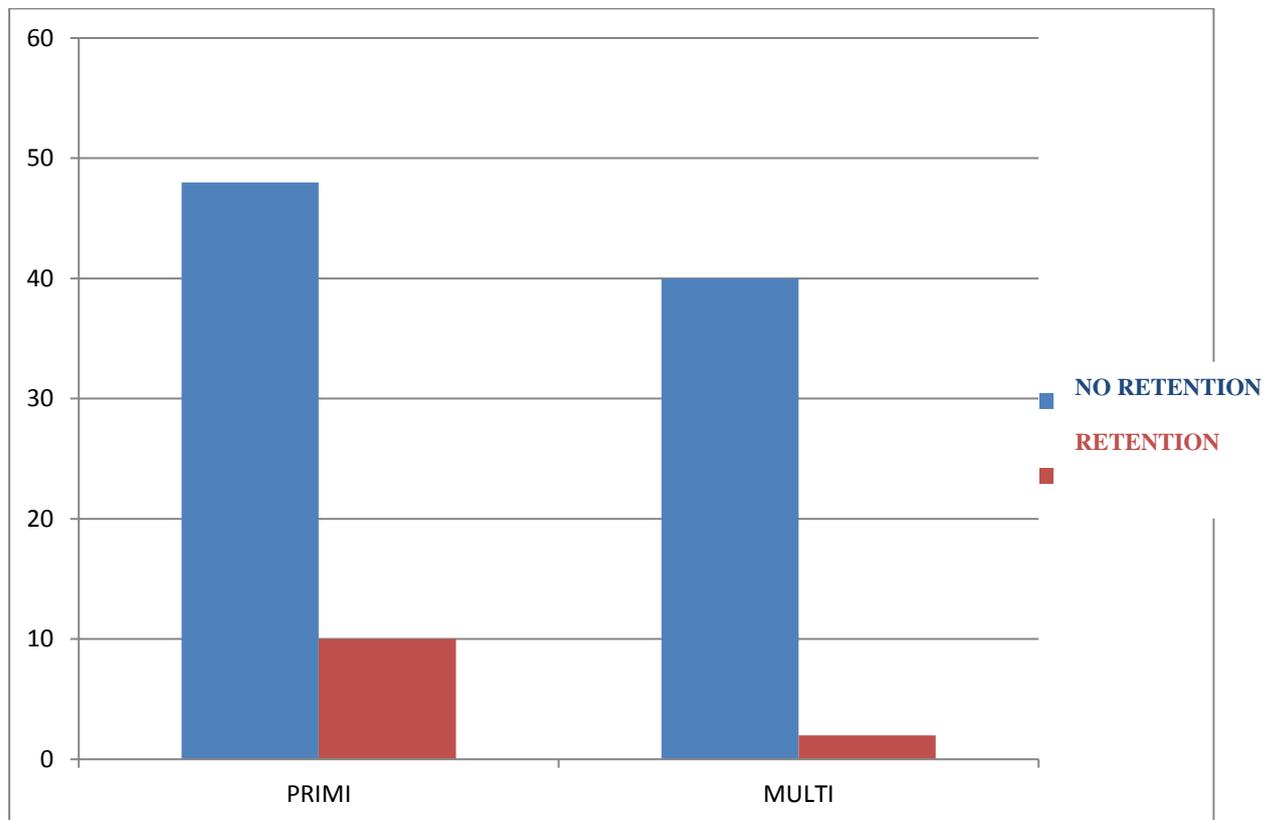
			OUTCOME		Total
			NO	RETENTION	
AGE GROUP	<=25	Count	51	10	61
		% within OUTCOME	58.0%	83.3%	61.0%
		% of Total	51.0%	10.0%	61.0%
	26 & Above	Count	37	2	39
		% within OUTCOME	42.0%	16.7%	39.0%
		% of Total	37.0%	2.0%	39.0%
Total	Count	88	12	100	
	% within OUTCOME	100.0%	100.0%	100.0%	
	% of Total	88.0%	12.0%	100.0%	



The mean birth weight of the babies in women with post partum urinary retention was 3428.25+/_389.185 grams whereas the mean birth weight of babies for women without post partum urinary retention was 3039.47+/_364.682grams, which was statistically significant (p = 0.001 S).

It was found that 10 out of 58 primigravidas had post partum urinary retention as compared to 2 out of 42 multigravidas with post partum urinary retention. Parity was not found to be significantly associated with urinary retention ($p = 0.156$).

PARITY



Crosstab

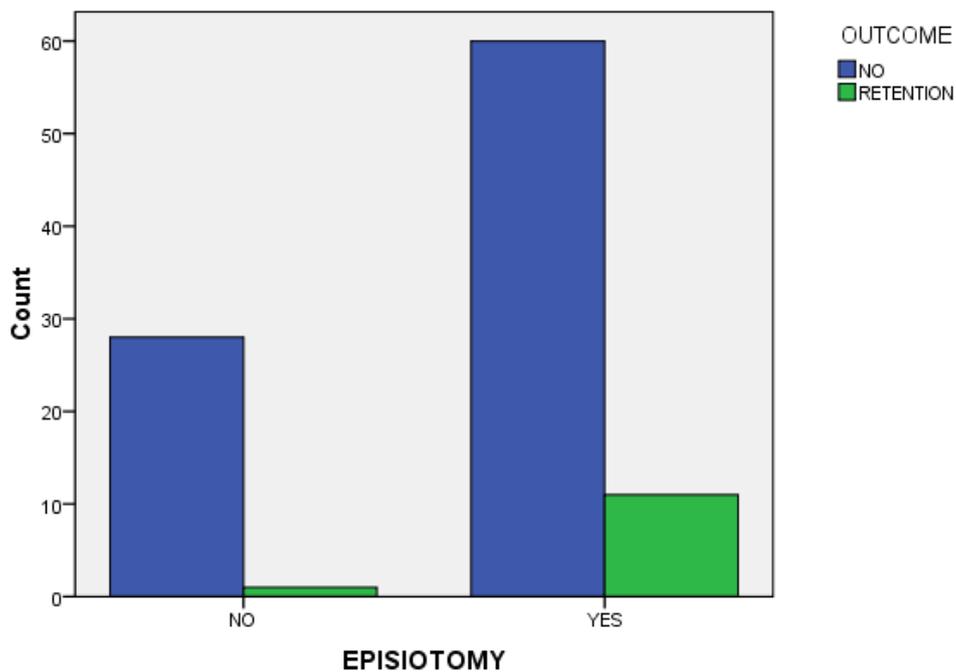
		OUTCOME			
		NO	RETENTION	Total	
PARITY	Primi	Count	48	10	58
		% within OUTCOME	54.5%	83.3%	58.0%
		% of Total	48.0%	10.0%	58.0%
	Gravida 2	Count	35	2	37
		% within OUTCOME	39.8%	16.7%	37.0%
		% of Total	35.0%	2.0%	37.0%
	Gravida 3	Count	5	0	5
		% within OUTCOME	5.7%	.0%	5.0%
		% of Total	5.0%	.0%	5.0%
Total		Count	88	12	100
		% within OUTCOME	100.0%	100.0%	100.0%
		% of Total	88.0%	12.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.714 ^a	2	.156
Likelihood Ratio	4.500	2	.105
Linear-by-Linear Association	3.558	1	.059
N of Valid Cases	100		

a. 3 cells (50.0%) have expected count less than 5. The minimum expected count is .60.

There were 71 patients who had an episiotomy. The remaining 29 patients delivered without an episiotomy. 11 out of 71 patients with episiotomy were diagnosed to have post partum urinary retention, whereas 1 out of 29 patients without episiotomy also had post partum urinary retention. This association was also not found to be statistically significant ($P = 0.093$, NS)



Crosstab

			OUTCOME		Total
			NO	RETENTION	
EPISIOTOMY	NO	Count	28	1	29
		% within OUTCOME	31.8%	8.3%	29.0%
		% of Total	28.0%	1.0%	29.0%
	YES	Count	60	11	71
		% within OUTCOME	68.2%	91.7%	71.0%
		% of Total	60.0%	11.0%	71.0%
Total	Count	88	12	100	
	% within OUTCOME	100.0%	100.0%	100.0%	
	% of Total	88.0%	12.0%	100.0%	

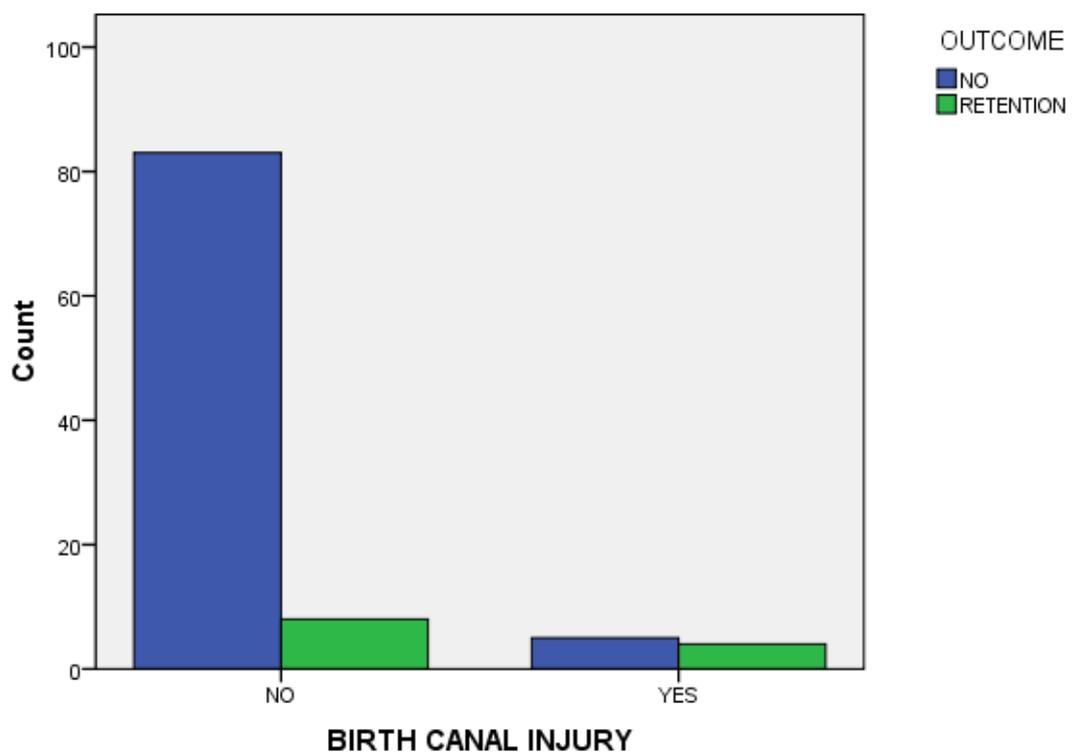
Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.829 ^a	1	.093		
Continuity Correction ^b	1.803	1	.179		
Likelihood Ratio	3.460	1	.063		
Fisher's Exact Test				.172	.083
N of Valid Cases	100				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.48.

b. Computed only for a 2x2 table

Birth canal injury was not found to be an associated risk factor for post partum urinary retention .There were 91 patients who did not sustain any birth canal injury.8 of these patients had post partum urinary retention. 9 patients had birth canal injury, out of which 4 patients had post partum urinary retention. (P = 0.002 S).



Crosstab

			OUTCOME		Total
			NO	RETENTION	
BIRTH CANAL INJURY	NO	Count	83	8	91
		% within OUTCOME	94.3%	66.7%	91.0%
		% of Total	83.0%	8.0%	91.0%
	YES	Count	5	4	9
		% within OUTCOME	5.7%	33.3%	9.0%
		% of Total	5.0%	4.0%	9.0%
Total	Count	88	12	100	
	% within OUTCOME	100.0%	100.0%	100.0%	
	% of Total	88.0%	12.0%	100.0%	

Chi-Square Tests

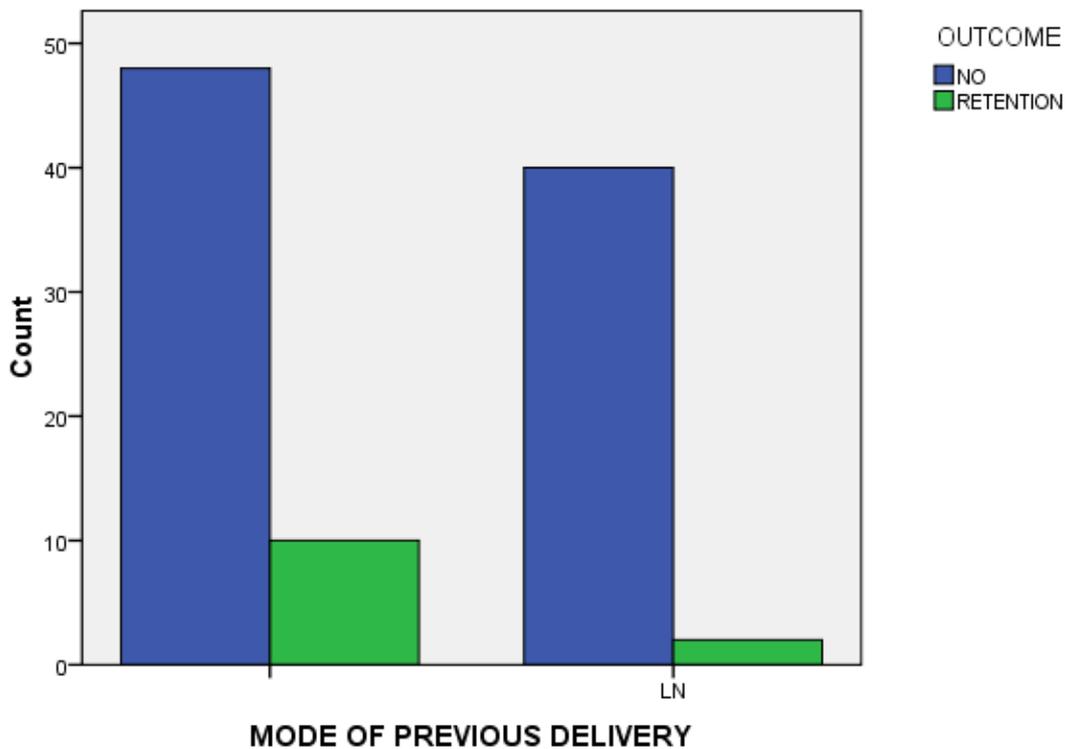
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9.859 ^a	1	.002		
Continuity Correction ^b	6.771	1	.009		
Likelihood Ratio	6.842	1	.009		
Fisher's Exact Test				.011	.011
N of Valid Cases	100				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 1.08.

b. Computed only for a 2x2 table

The type of delivery in the previous pregnancy also did not have any association with post partum urinary retention. 42 patients had previous normal delivery. 2 patients of 42 patients with previous normal delivery had urinary retention.

(P = 0.058, NS).The remaining 10 patients with retention were primigravidas and hence not included in the calculation.



Crosstab

		OUTCOME		Total
		NO	RETENTION	
MODE OF PREVIOUS DELIVERY	Count	48	10	58
	% within OUTCOME	54.5%	83.3%	58.0%
	% of Total	48.0%	10.0%	58.0%
LN	Count	40	2	42
	% within OUTCOME	45.5%	16.7%	42.0%
	% of Total	40.0%	2.0%	42.0%
Total	Count	88	12	100
	% within OUTCOME	100.0%	100.0%	100.0%
	% of Total	88.0%	12.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.593 ^a	1	.058		
Continuity Correction ^b	2.508	1	.113		
Likelihood Ratio	3.979	1	.046		
Fisher's Exact Test				.068	.053
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.04.

b. Computed only for a 2x2 table

The variable,mode of delivery in the present pregnancy is found to be significantly associated with post partum urinary retention .

Table 4

**MODE OF DELIVERY AND POST PARTUM URINARY
RETENTION**

Crosstab

		OUTCOME		
		NO	RETENTION	Total
MODE OF DELIVERY LN	Count	81	0	81
	% within OUTCOME	92.0%	.0%	81.0%
	% of Total	81.0%	.0%	81.0%
Assisted delivery	Count	7	12	19
	% within OUTCOME	8.0%	100.0%	19.0%
	% of Total	7.0%	12.0%	19.0%
Total	Count	88	12	100
	% within OUTCOME	100.0%	100.0%	100.0%
	% of Total	88.0%	12.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	58.134 ^a	1	.000		
Continuity Correction ^b	52.307	1	.000		
Likelihood Ratio	48.377	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	57.553	1	.000		
N of Valid Cases	100				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.28.

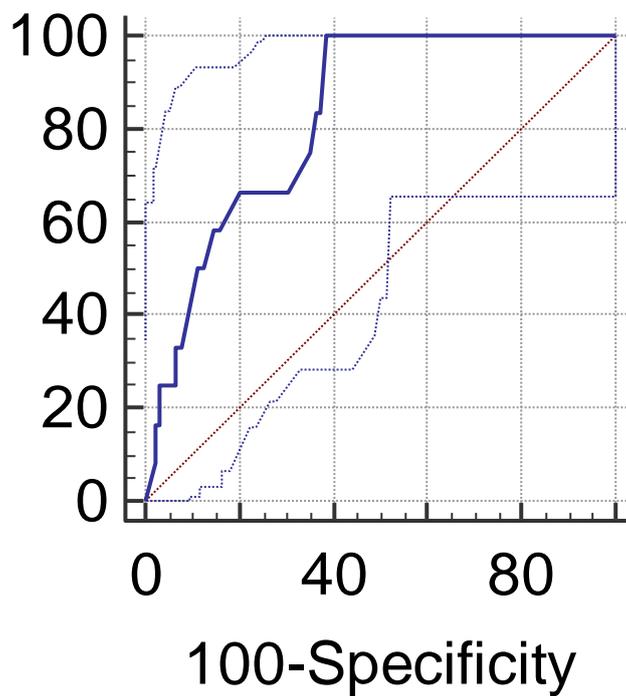
b. Computed only for a 2x2 table

81 patients out of 100 patients delivered normally whereas the remaining 19 patients had an assisted delivery. no patients with normal delivery had post partum urinary retention whereas 63.15% patients with post partum urinary retention had assisted delivery (n = 12). p = 0.000 which was statistically significant on univariate analysis.

The mean for the duration of labour in patients with post partum urinary retention (n = 12) was 390.00 minutes. The mean for the duration of labour in patients without post partum urinary retention (n = 88) was 308.07 mins.

In this study receiver operating characteristic (ROC) curve was used to select the cut off value for the duration of labour that predicted post partum urinary retention. The ROC curve is shown in FIG.1 Area under the curve was estimated and the 95% confidence interval was computed . A value of $p < 0.05$ was considered statistically significant.

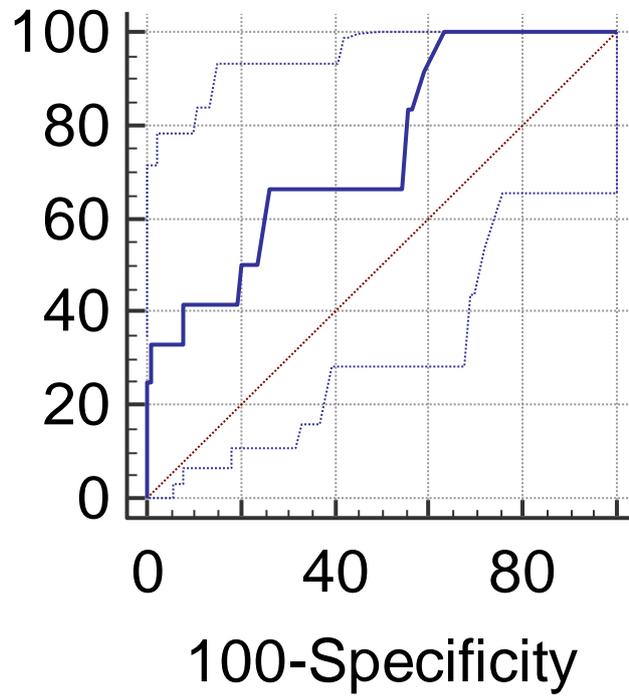
DURATION OF LABOUR(min)



Cutoff (mins)	Sensitivity	95% CI	Specificity	95% CI	+L R	-LR
≥150	100.00	73.5 - 100.0	0.00	0.0 - 4.1	1.00	
>320	100.00	73.5 - 100.0	61.36	50.4 - 71.6	2.59	0.00
>325	83.33	51.6 - 97.9	62.50	51.5 - 72.6	2.22	0.27
>330	83.33	51.6 - 97.9	63.64	52.7 - 73.6	2.29	0.26
>340	75.00	42.8 - 94.5	64.77	53.9 - 74.7	2.13	0.39
>345	66.67	34.9 - 90.1	69.32	58.6 - 78.7	2.17	0.48
>370	66.67	34.9 - 90.1	79.55	69.6 - 87.4	3.26	0.42
>380	58.33	27.7 - 84.8	84.09	74.8 - 91.0	3.67	0.50
>385	58.33	27.7 - 84.8	85.23	76.1 - 91.9	3.95	0.49
>390	50.00	21.1 - 78.9	87.50	78.7 - 93.6	4.00	0.57
>395	50.00	21.1 - 78.9	88.64	80.1 - 94.4	4.40	0.56
>410	33.33	9.9 - 65.1	92.05	84.3 - 96.7	4.19	0.72
>420	33.33	9.9 - 65.1	93.18	85.7 - 97.5	4.89	0.72
>425	25.00	5.5 - 57.2	93.18	85.7 - 97.5	3.67	0.80
>430	25.00	5.5 - 57.2	96.59	90.4 - 99.3	7.33	0.78
>435	16.67	2.1 - 48.4	96.59	90.4 - 99.3	4.89	0.86
>440	16.67	2.1 - 48.4	97.73	92.0 - 99.7	7.33	0.85
>445	8.33	0.2 - 38.5	97.73	92.0 - 99.7	3.67	0.94
>450	0.00	0.0 - 26.5	100.00	95.9 - 100.0		1.00

In our study, duration of labour was used to plot an ROC curve and the AUC ROC was used to predict post partum urinary retention. The area under the curve was found to be 0.825 (95% CI, 0.736- 0.894), with $p = 0.0001$. When 320 minutes was used as the optimum cut off for duration of labour, the specificity of the test was 61.36%, sensitivity of 100%. The likelihood ratio for positive test is 2.59. It is found that as the duration of labour increases, the sensitivity decreases and the specificity decreases.

BIRTH WEIGHT



Cutoff (gms)	Sensitivity	95% CI	Specificity	95% CI	+LR	-LR
≥2100	100.00	73.5 - 100.0	0.00	0.0 - 4.1	1.00	
>2967	100.00	73.5 - 100.0	36.36	26.4 - 47.3	1.57	0.00
>3000	91.67	61.5 - 99.8	40.91	30.5 - 51.9	1.55	0.20
>3045	83.33	51.6 - 97.9	43.18	32.7 - 54.2	1.47	0.39
>3050	83.33	51.6 - 97.9	44.32	33.7 - 55.3	1.50	0.38
>3070	66.67	34.9 - 90.1	45.45	34.8 - 56.4	1.22	0.73
>3245	66.67	34.9 - 90.1	73.86	63.4 - 82.7	2.55	0.45
>3250	50.00	21.1 - 78.9	76.14	65.9 - 84.6	2.10	0.66
>3321	50.00	21.1 - 78.9	79.55	69.6 - 87.4	2.44	0.63
>3345	41.67	15.2 - 72.3	80.68	70.9 - 88.3	2.16	0.72
>3465	41.67	15.2 - 72.3	92.05	84.3 - 96.7	5.24	0.63
>3500	33.33	9.9 - 65.1	92.05	84.3 - 96.7	4.19	0.72
>3555	33.33	9.9 - 65.1	98.86	93.8 - 100.0	29.33	0.67
>3654	25.00	5.5 - 57.2	98.86	93.8 - 100.0	22.00	0.76
>3867	25.00	5.5 - 57.2	100.00	95.9 - 100.0		0.75
>4100	0.00	0.0 - 26.5	100.00	95.9 - 100.0		1.00

In this study receiver operating curve (ROC) was used to select the cutoff value for the birth weight that will predict the postpartum urinary retention. area under the curve was estimated and the 95% confidence interval was computed. A value of $p < 0.05$ was considered statistically significant.

The area under the curve using birth weight was 0.743 with 95% confidence interval (0.646-0.825) with $p = 0.0016$

The table shows a range of cutoff values with a specificity ranging from 36.36 % to 100 % for the fetal birth weight. When a cut off of 3245 gms was used, the specificity of the test was 73.86% and sensitivity was 66.67%.

The likelihood ratio for a positive test was 2.55 and the likelihood ratio for a negative test was 0.45. It is found that as the birth weight increases, the sensitivity of the test decreases and the specificity increases.

FOLLOW UP

The nine patients with covert urinary retention were followed up with a second post void bladder volume estimation by ultrasound .

No one had post void volume of ≥ 150 ml. At discharge, no one had any symptoms of bladder dysfunction.

There were three patients who had overt retention. The ultrasound first post void bladder volume for these patients were 1200 ml,1000 and 750ml respectively. Both these patients were catheterised for 24 hours. After catheter removal the patients were rescanned after their first void. Their post void residual bladder volumes were 52ml,45ml and 33ml respectively. Then these patients were advised for follow up after 3 months.

They were contacted through phone and enquired about the urinary symptoms. None of them had symptoms of frequency, hesitancy, urgency, stress incontinence, poor flow, or incomplete voiding.

DISCUSSION

Post partum urinary retention occurs in significant number of women, and it can cause permanent damage to the bladder detrusor muscle and long term complications if left untreated. PPUR goes undetected as most of the patients are asymptomatic. The incidence may range from 0.05% to 37%. In our study, the overall incidence of post partum urinary retention was found to be 12%. The incidence of covert retention is 9% which is much more than that of overt retention which is 3%. Patients with covert retention are asymptomatic and are diagnosed by measuring postvoid residual bladder volume by ultrasound or by catheterisation. These patients might go in for long term complications. Acute overdistention of the bladder leads to damage to detrusor syncytium with ischemic damage to the post synaptic parasympathetic fibres.

Overt retention can be detected as these patients will have signs and symptoms of post partum urinary retention like pain lower abdomen, inability to void, and dribbling of urine (overflow incontinence).

Previous studies have evaluated the relationship between obstetric risk factors and post partum urinary retention. In the largest retrospective case controlled study by M. Carley et al, the factors associated with clinically overt retention were studied.

A total of 51 patients of 11,332 (0.45%) vaginal deliveries were complicated by symptomatic overt urinary retention. In most of the patients (80.4 %) the problem resolved before hospital discharge. It was shown that patients with urinary retention were more likely than control patients to be primiparous(66.7% vs 40%, $p < 0.001$). These patients had higher incidence of instrumental deliveries than controls (47.1% vs 12.4%, $p = 0.001$). The patients with urinary retention were more likely to have received regional analgesia 98% vs 68.8%; $p < 0.001$, and to have had a mediolateral episiotomy 39.2 % vs 12.5%;

$p < 0.001$. On multivariate regression analysis, only instrument assisted delivery and regional analgesia were found to be significant risk factors.

Studies have shown that primiparity was associated with more post partum urinary retention. In an observational prospective study by Liang et al, to assess the contributing risk factors and the long term impacts of post partum urinary retention, included a total of 2866 women, delivered vaginally. 114 women were classified as urinary retention group and the remaining 2752 women categorized as control group.78.1% of patients who had urinary retention were primiparas

($n = 114$) vs 45.8% of controls ($n = 2752$), $p < 0.001$.(4).

In our study we found no association between parity and post partum urinary retention, $p = 0.156$, NS.

It was found that 10 out of 58 primigravidas had post partum urinary retention as compared to 2 out of 42 multigravidas with post partum urinary retention.

Instrumental delivery was significantly associated with post partum urinary retention in most of the studies. In the retrospective study by Liang et al ,a total of fifty one patients of 11,332 (0.45%) vaginal deliveries were complicated by clinically overt urinary retention. These patients had higher incidence of instrumental deliveries than controls (47.1% vs 12.4%, $p < 0.001$).On multivariate regression ,instrumental delivery was found to be associated with overt postpartum urinary retention.(4).

In our study, we found that patients who had an assisted delivery were more prone to have post partum urinary retention. 81 patients out of 100 patients delivered normally whereas the remaining 19 patients had an assisted delivery. In our study no patients with normal delivery had urinary retention.12 patients with post partum urinary retention had assisted delivery. $p = 0.000$ which was statistically significant on univariate analysis.

Regional analgesia has been associated with post partum urinary retention by several people. In women who received regional analgesia, the incidence of post partum urinary retention was 98.0% as against women who did not receive regional analgesia (68.8%, $p < 0.001$). Other studies have also supported this finding . Roderick et al, did a retrospective case control study to determine the incidence of overt post partum urinary retention after vaginal delivery and to establish associated risk factors. They included 15,757 deliveries from 2001- 2005. There were 30 cases of overt post partum retention, (0.2 %) There were 120 time matched controls .The use of regional analgesia was associated with an increased risk for post partum urinary retention .(OR 6.33,CI 2.01- 19.96, $p < 0.0001$).In our study ,there were no patients who received regional analgesia during labour or delivery .

Episiotomy again is associated with an increased incidence of post partum urinary retention ,39.2% cases vs 12.5% control ($p < 0.0001$) .In our study, episiotomy is not associated with post partum urinary retention. There were 71 patients who had an episiotomy during delivery. The remaining 277 patients delivered without an episiotomy. 61 out of 494 patients (12.3%) with episiotomy were diagnosed to have post partum urinary retention, whereas 23 out of 277 patients without episiotomy also had post partum urinary retention.

It was not found to be statistically significant($P = 0.093$, NS).Birth canal injury, and severe perineal lacerations were found to be associated with post partum urinary retention . In a retrospective study by Ling et al, patients with extensive vaginal or perineal lacerations were associated with higher incidence of post partum urinary retention.41.2 % cases had birth canal injury and urinary retention (n = 114), as compared to 7.1% controls ,(n= 2752), $p < 0.001$. In our study however birth canal injury is associated with increased incidence of post partum urinary retention.

There were 9 patients who sustained birth canal injury.Out of which ,4 patients had postpartum urinary retention.which was found to be statistically significant. ($P = 0.002$, S).

Yip et al 1997, found that duration of labour $> / = 800$ min was significantly associated with post partum urinary retention, $p > 0.001$. The other obstetric variables like parity, mode of delivery, birth canal trauma, epidural anaesthesia, instrumental delivery and episiotomy were found to be the confounding factors. They presented one hypothesis that during prolonged labour, the presenting part of the fetus may exert pressure on the pelvic floor and soft tissues, including the pelvic nerves, which may subsequently lead to either urinary outflow obstruction by tissue oedema, or detrusor dysfunction due to neurapraxia. Our study also found that prolonged duration of labour was definitely associated with post

partum urinary retention and the association was statistically significant $p < 0.000$. The mean for the duration of labour in patients with post partum urinary retention ($n = 12$), was 390.00 minutes. The median for the duration of labour in patients without post partum urinary retention ($n = 88$) was 308.07 minutes ($p < 0.000$), which was statistically significant.

Fetal birth weight has been evaluated as a causative risk factor for post partum urinary retention. It is found to be associated with post partum urinary retention in some studies. In our study, shows that birthweight is significantly associated with post partum urinary retention. The mean birthweight of the babies in women with post partum urinary retention was 3428.25 grams whereas the mean birth weight of babies for women without post partum urinary retention was 3039.47 grams, which was found to be statistically significant ($P = 0.001, S$).

In our study age of the patient, as a risk factor, was not found to be significantly associated with postpartum urinary retention.. In an observational prospective study by Liang et al, to assess the contributing factors and long term impacts of post partum urinary retention, included a total of 2866 women, delivered vaginally. 114 women were classified as urinary retention group and the remaining 2752 women categorized as control group. Women in the urinary retention group and control groups did not differ significantly in terms of age, and fetal birth

weight.

In our study the mean age of the patients with post partum urinary retention was 23.50 +/-2.393 years compared to 25.09+ / - 3.027 years in those without urinary retention .(p = 0.084 NS)

In our study,we also analyzed the mode of previous delivery as an associated risk factor for post partum urinary retention .We found that the mode of previous delivery is not associated with post partum urinary retention. (P = 0.058,NS).

In a previous study by Yip et al, six hundred and ninety patients were randomized into two groups . An ROC curve was used to determine the optimum cutoff value of duration of labour for detecting post partum urinary retention. This would then help in screening patients to detect post partum urinary retention. Using an optimal cutoff of 700 min, for the duration of labour, area under the curve ROC was 0.63, (95% CI 0.57-0.69), which gave a specificity of 95%, sensitivity 15%, Negative Predictive Value of 86%,Likelihood ratio of negative test of 88%, Likelihood ratio for positive test was 4.9% .The sensitivity ,Positive Predictive Value, Likelihood Ratio for Positive Test could not be raised without compromise to specificity.

In our study, duration of labour was used to plot an ROC curve and the AUC ROC was used to predict post partum urinary retention. The area under the curve was found to be 0.825 (95% CI, 0.736- 0.894), with $p = 0.0001$. When 320 minutes was used as the optimum cut off for duration of labour, the specificity of the test was 61.36%, sensitivity of 100%.

There are several short term and long term complications of post partum urinary retention .Patient distress due to outflow obstruction, hesitancy, frequency, urgency, poor flow, bladder over distension causing pain and discomfort, overflow incontinence and infection are some of the immediate or short term complications .

Most of the studies have focused on the immediate post partum complications. Almost all these studies have demonstrated that, covert retention resolved spontaneously without requiring any specific intervention.

Yip et al, monitored the post void residual bladder volume of 67 women with covert post partum urinary retention ($PVRBV \geq 150\text{ml}$), using ultrasound. Despite not using any form of bladder drainage as treatment, the condition resolved in all women by post partum day 4, with the majority (82%) resolving after the first day.

Overt retention on the other hand required bladder catheterization, although the length of time post partum urinary retention persists is variable. Carley et al, in the largest to date retrospective study of 51 women with overt post partum urinary retention, reported that the length of time required for post partum urinary retention to resolve was more than 3 days in 25.5% cases. Ten patients had persistent post partum urinary retention at the time of hospital discharge. They were successfully treated with either intermittent self-catheterization or an indwelling urethral catheter. All patients ultimately had resolution of urinary retention; the longest duration was 45 days after delivery.

In a study by Liang et al, on the long term impacts of post partum urinary retention; the results showed that three patients out of 114 women had persistent post partum retention and long term (9 months postpartum) complaints of frequency and strenuous voiding.

Data on persistent post partum urinary retention beyond the immediate post partum period and long term complications of post partum urinary retention is scarce. Persistent post partum urinary retention is defined as the inability to void spontaneously despite use of indwelling catheter for 3 days. They studied 8402 patients for persistent post partum urinary retention after delivery.

Four patients developed persistent post partum urinary retention, 2 of them required catheterisation for 1-2 weeks. The other 2 patients, required the insertion of suprapubic catheter for 28 and 40 days respectively . On follow up by urodynamics, one month after removal of suprapubic catheters, these patients were found to have stress urinary incontinence and detrusor instability.

Follow up of our patients in this study showed that all of the 9 patients with covert retention were asymptomatic at discharge. We had only three patients with overt retention, and they had indwelling urethral catheter for 24 hours. After removal, both these women underwent scan for post void bladder volume which showed a residual urine < 150 ml. They were discharged and asked to follow up in 3 months to look for persisted urinary retention or any other complication . These 3 patients were contacted over phone and enquired about the urinary symptoms. None of them had urinary symptoms.

Bladder atony, secondary to increased progesterone during pregnancy and early puerperium may also play a role. Delayed detection or misdiagnosis of bladder over distention may therefore cause irreversible detrusor damage.

Therefore care should be taken to identify patients at risk of developing post partum urinary retention. Early diagnosis of post

partum urinary retention, may facilitate timely intervention and therefore bladder distention and associated detrusor dysfunction can be prevented. Hence, if a woman is unable to void spontaneously after delivery they must be encouraged for early ambulation, asking the patient to listen to running water or taking a warm bath. If the patient is still unable to void, then she should be relieved of over distention by an indwelling urethral catheter for at least 24 hours.

If the patient still has persistent post partum urinary retention after 24 hrs (ultrasound PVRBV > 150ml), she should be advised intermittent self – catheterization, till the residual volume is < 150 ml.

CONCLUSION

Our study has shown that

1. The overall incidence of post partum urinary retention was 12%.
2. The incidence of overt retention was found to be 3% .
3. The incidence of covert retention was found to be 9%
4. Duration of labour was significantly associated with post partum urinary retention. The area under the curve ROC, was 0.825(95% CI, 0.736- 0.894), $p < 0.0001$. The specificity of the test was 97.73%, sensitivity of 8.83%,. The likelihood ratio for a positive test was 3.67 and the likelihood ratio for a negative test was 0.94 .
5. Women with assisted delivery were found to be more prone to have post partum urinary retention .12 patients with post partum urinary retention had assisted delivery whereas none of the patients with normal delivery had post partum urinary retention . $p=0.000$.
6. Women who had birth canal injury were found to have postpartum urinary retention. There were 9 patients who sustained birth canal injury. Out of which 4 had postpartum urinary retention, which was found to be statistically significant. $p=.002$
7. In our study birth weight is significantly associated with postpartum urinary retention. The mean birth weight of babies in women with postpartum urinary retention was 3428.25 grams whereas the mean

birth weight of babies for women without postpartum urinary retention was 3039.47 grams, which was found to be statistically significant ($p=0.001$, S).

BIBLIOGRAPHY

1. Saultz JW, Toffer WL, Sbackles JY. Postpartum urinary retention J AmBoard Fam Pract 1991; 4 : 341-344.
2. Yip SK, Sahota D, Pang MW, Chang A. Postpartum urinary retention . Acta ObstetGynecolScand 2004; 83: 881-891
3. Ching-Chung L, Shuenn- Dhy C, Ling-Hong T, Ching- Chang H, Chao-Lun C, Po-Jen C. Postpartum urinary retention: assessment of contributing factors and long term clinical impact. Aust NZ J ObstetGynecol 2002; 42: 273- 276.
4. Carley ME, Carley JM, Vasdev G, Lesnick TG, Webb MJ, Ramin KD, al. Factors that are associated with clinically overt postpartum retention after vaginal delivery. Am J ObstetGynecol 2002; 187: 430-433.
5. Yip SK, Brieger G, Hin LY, Chung T. Urinary retention in the postpartum period. The relationship between obstetric factors and the postpartum postvoid residual bladder volume. Acta ObstetGynecolScand 1997; 76: 667-672.
6. Liang CC, Wong SY, Tsay PK, Chang SD, Tseng LH, Wang MF et al. The effect of epidural analgesia on postpartum urinary retention in women who deliver vaginally . Int J ObstetAnesth 2002; 11: 164 – 169.

7. Andolf E, Iosif Cs, Jorgensen C, Rydhstrom H. Insidious urinary retention after vaginal delivery.: prevalence and symptoms at follow up in a population based study. *Gynecol Obstet Invest* 1994; 38: 51-53.
8. Weil A, Reyes H, Rottenberg RD, Beguin F ,Herrmann WL. Effect of lumbar epidural analgesia on lower urinary tract function in the immediate postpartum period *Br J Obstet Gynecol* 1983; 90: 428-432.
9. Griffiths CJ, Murray A, Ramsden PD 1986 .Accuracy and repeatability of bladder volume measurement using ultrasound imaging .*J Urology* 136;808-12.
10. Bennetts FA, Judd GE,;Studies of the postpartum bladder. *Am J Obstet Gynecol* 1991; 42 : 419-427.
11. Seski AG, Duprey WM, ;Postpartum intravesical photography; *Obstet Gynecol* 1961;18:548-556.
12. Iosif S, Ingemarsson I ,Ulmsten U ;Urodynamic studies in normal pregnancy and in puerperium. *Am J Obstet Gynecol* 1980 ;Jul 15; 137 (6) : 696-700.
13. Kermans G, Wyndaele JJ, Thiery M DeSy W. Puerperal urinary Retention. *Acta Urol Belg* 1986; 54: 376-585.
14. Lobel RW, Sand PK, Bowen LW. The urinary tract in pregnancy *Urogynaecand Urodyn*, 4th edn. Baltimore, MD; Williams and Williams 1996;323.

15. Eliot RA, Castledin CM, Duffin HM, The effect of progesterone and oestrogen on rat detrusor muscle. *Neurourol Urodyn* 11: 345- 346.
16. Artrin CF, Wachel MS, How patients are necessary to assess test performance. *JAMA* 1990; 263; 275-278
17. Osborne JL, Urodynamics & the gynaecologists. (Alec Browne Lecture, London RCOG Press 1981.)
18. Groutz A, Gordon D, Wolman I, Jaffa A, Kupferminc MJ, Lessing JB. Persistent postpartum urinary retention in contemporary obstetric practice. Definition, prevalence and clinical implications. *J Reprod Med* 2001; 46: 44-48 (Level III-2)
19. Chai AH, Wong T, Mak HL, Cheon C, Yip SK, Wong AS, Prevalence and associated risk factors of retention of urine post partum, *Int. Urogynecol J Pelvic Floor Dysfunction* 2007 Oct 12; (Epub ahead of print)
20. CC Liang, S-D Chang, YL Chang, Post partum urinary retention after caesarean section in Taiwanese women; manuscript draft; *Int J of Obstet Gynecol*, 2007
21. Jeffery TJ, Chung TKH; Chronic urinary retention post partum. *Aust NZ Obstet Gynaecol* 1990; 30: 364-366.
22. Blaivas JG; The Neurophysiology of normal micturition. A clinical study of 550 patients. *JUrol* 127 : 953- 963, 1982

23. Yip SK, Sahota D, Pang MW, Chang AMZ: Screening test model using duration of labor for the detection of postpartum urinary retention. *NeuroUrology and Urodynamics* 2005; 24:248–253.
24. Wein AJ, Levin RM, Barnett DM, ; Voiding dysfunction and function Adult and Pediatric Urology, 5th Edn, Chicago yearbook Medical Publishers, 1991, pp 993- 1100.
25. Bhatia NN, Bradley We; Neuroanatomy and Physiology . Innervation of the urinary tract, In Raz S (ed): Female Urology . Philadelphia, WB Saunders 1983 pp 12-32.
26. Norden L : Influence of the sympathetic nervous system on the lower urinary tract and its clinical importance. *NeuroUrology and Urodynamics* 1 : 129 – 138 1932.
27. Roderick Teo, K Abrams, D Tincello; Clinically Overt PUR after vaginal delivery: A retrospective case control study: *Int. Urogynecology J* (2007) 18; 521-524.
28. Oloffson CI, Ekblom AO, Ekman-Ordeberg GE, (1997), Post partum Urinary Retention: A comparison between two methods of epidural analgesia; *Eur J ObsGynecolReprod Biol* 71: 31-34.
29. Ramsay IN, Torbet TE: Incidence of abnormal voiding parameters in the immediate postpartum period. *NeuroUrology and Urodynamics* 1993; 38: 51-53.
30. Muellner SR. Physiological bladder changes during pregnancy and puerperium. *J . Urol* 1939 ; 41: 691- 692.

PROFORMA:

Name

Age

Parity

Mode of delivery

Birth weight

Duration of labour

Episiotomy

Perineal trauma

Mode of previous delivery

Whether passed urine or not within 6 hrs

If yes, post void residual bladder volume

INFORMATION SHEET

We are conducting a study on **“POSTPARTUM URINARY RETENTION AFTER VAGINAL DELIVERY”** among patients delivered in Department of Obstetrics and Gynecology, Madras Medical College, Chennai and for that your clinical details may be valuable to us.

We are selecting certain patients and if you are found eligible, we may be using your clinical details in such a way so as to not affect your final report or management.

The privacy of the patients in the research will be maintained throughout the study. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared.

Taking part in this study is voluntary. You are free to decide whether to participate in this study or to withdraw at any time; your decision will not result in any loss of benefits to which you are otherwise entitled.

The results of the special study may be intimated to you at the end of the study period or during the study if anything is found abnormal which may aid in the management or treatment.

Signature of investigator

Signature of participant

Date:

CONSENT FORM

STUDY TITLE : **“POSTPARTUM URINARY RETENTION AFTER VAGINAL DELIVERY-ASSESSMENT OF OBSTETRIC RISK FACTORS”**

STUDY CENTRE : **DEPARTMENT OF OBSTETRICS AND GYNECOLOGY, MADRAS MEDICAL COLLEGE, CHENNAI**

PARTICIPANT NAME : **AGE: SEX: MRD.NO:**

I confirm that I have understood the purpose of procedure for the above study, I have the opportunity to ask the question and all my questions and doubts have been answered to my satisfaction.

I have been explained about the possible complications that may occur during the procedure. I understand that my participation in the study is voluntary and that I am free to withdraw at any time without giving any reason.

I understand that investigator, regulatory authorities and the ethics committee will not need my permission to look at my health records both in respect to the current study and any further research that may be conducted in relation to it, even if I withdraw from the study. I understand that my identity will not be revealed in any information released to third parties or published, unless as required under the law. I agree not to restrict the use of any or results that arise from the study.

I hereby consent to participate in this study of **“POSTPARTUM URINARY RETENTION AFTER VAGINAL DELIVERY-ASSESSMENT OF OBSTETRIC RISK FACTORS”**.

Signature of Investigator :

Place : Chennai

Date :

Study Investigators Name

Institution

Signature / Thumb Impression of patient

Muha;r;rp jfty; jhs;

@Rfg; gpurtj;jpw;F gpd; Vw;gLk; rpWePh; njf;fk;@ gw;wpa Ma;t[/

Ma;tpd; neh;fk; :

Rfg; gpurtj;jpw;F gpd; Vw;gLk; rpWePh; njf;fj;jpw;F fhuzkhd kfg;ngipay; Mgj;J fhuzpfs; vit vd;gij fz;lwpjy;/

Ma;tpd; bray;Kiw :

Ma;tpy; g';nfw;Fk; g';nfw;Fk; Rfg;gpurtkhfpa midj;Jg; bgz;fSf;Fk; mth;fs; gpurtj;jpw;F gpd; rpWePh; fHpj;j gpd; my;l;uh rt[z;l; K:yk; rpWePh;g;igapy; kPjKs;s rpWePh; msit fz;lwpth;/

Ma;tpdhy; Vw;gLk; ed;ikfs; :

Rfg;gpurtk; Mfpa bgz;fSf;F rpWeP;h;nj;fk; Vw;gLtjw;fhd kfg;ngipay; Mgj;J fhuzpfs; fz;lwpj;J tU';fhy;jjpy; Rfg;gpurtk; MFk; bgz;fSf;F rpWePh; njf;fk; Vw;glhky; ,Uf;f tha;g;g[mika[k;/

kUj;Jt rpfpr;irapd; jfty;fs; Fwpj;j tpgu';fs; :

c';fs; kUj;Jt rpfpr;ir gw;wpa jfty;fs; ,ufrpakhf ghJfhf;fg;gLk;/

eP';fSk; ,e;j Muha;r;rpapy; g';nfw;f eh';fs; tpUk;g[fpnwhk;/ ,e;j Muha;r;rpapy; c';fSf;F ghpnrhjids; bra;J mjd; jfty;fis Muha;nthk;/ mjdh; j';fs; nehpd; Ma;twpf;ifnah my;yJ rpfpr;irnah ghjpg;g[Vw;glhJ vd;gija[k; bjhptj;Jf; bfhs;fpnwhk;/ Kot[fs; my;yJ fUj;Jf;fis btspapLk;ngnhj my;yJ Muha;r;rpapd; ngnhj j';fs; bgaiunah my;yJ milahs';fisnah btspapLkhl;nlhk; vd;gij bjhptj;Jf; bfhs;fpnwhk;/

,e;j Muha;r;rpapy; g';nfw;gJ j';fsJ tpUg;gj;jpd; nghpy;jhd; ,Uf;fpwJ/ nkYk; eP';fs; ve;neuKk; ,e;j Muha;r;rpapypUe;J gpd;th';fyhk; vd;gija[k; bjhptj;Jf; bfhs;fpnwhk;/

,e;j rpwg;g[rpfpr;irapd; Kot[fs; Muha;r;rpapd;ngH my;yJ Muha;r;rp Kotpd;ngH j';fSf;F mwptpf;fg;gLk; vd;gija[k; bjhptj;Jf; bfhs;fpnwhk;/

Muha;r;rpahsh; ifbahg;gk;

g';nfw;ghsh; ifbahg;gk;

njjp :

,lk; :

Ra xg;g[jy; gotk;

@Rfg; gpurtj;jpw;F gpd; Vw;gLk; rpWePh; njf;fk;@; gw;wpa Ma;t[/

Ma;t[elj;jg;gLk; ,lk; :

jha; nra; ey kUj;Jtkid. brd;id kUj;Jtf; fy;Y}hp. brd;id/

g';F bgWgthpd; bgah; :

g';F bgWgthpd; taJ :

g';F bgWgthpd; vz; :

,e;j Ma;tpy; Fwpg;gpl;Ls;s kUj;Jt Ma;tpd; tptu';fs; vdf;F tpsf;fg;gl;IJ/ ehd; ,t;tha;tpy;
jd;dpr;irahf g';nfw;fnpwd; ve;j fhuzj;jpdhnyh ve;j rl;l rpf;fyf;Fk; cl;glhky; ehd; ,t;tha;tpy; ,Ue;J
tpyfpf; bfhs;syhk; vd;Wk; mwpe;J bfhz;nld;/

,e;j Ma;t[rk;ge;jkhfnth mij rhh;e;J nkYk; Ma;t[nkW;bfhs;Sk; nghJk; ,e;j Ma;tpy; g';F
bgWk; kUj;Jth; vd;Dila kUj;Jt mwpf;iffis ghg;g;gjw;F vd; mDkjp njitapy;iy vd;gij mwpe;J
bfhs;fnpwd;/ ,e;j Ma;tpd; K;yk; fpilf;Fk; Koit gad;gLj;jpf; bfhs;s kWf;fkhl;nld;/

,e;j Ma;tpy; g';F bfhs;s xg;g[f; bfhs;fnpwd;/ ,e;j Ma;it nkW;bfhs;Sk; kUj;Jt mzpF;F
cz;ika[lD; ,Ug;ngd; vd;Wk; cWjpaspf;fnpwd;/

g';nfw;gthpd; ifbahg;gk;

rhl;rpfspd; ifbahg;gk;

,lk; :

,lk; :

njjp :

njjp :

g';nfw;gthpd; bgah; kw;Wk; tpyhrk; :

Ma;thshpd; ifbahg;gk; :

f

**INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI 600 003**

EC Reg.No.ECR/270/Inst./TN/2013
Telephone No.044 25305301
Fax: 011 25363970

CERTIFICATE OF APPROVAL

To
Dr.S.Suganya
Post Graduate in M.S. O & G
Madras Medical College
Chennai 600 003

Dear Dr.S.Suganya ,

The Institutional Ethics Committee has considered your request and approved your study titled "**POSTPARTUM URINARY RETENTION AFTER VAGINAL DELIVERY**" - **NO.06012017 (IV)**.

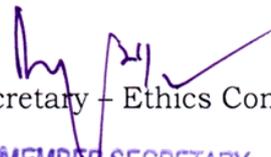
The following members of Ethics Committee were present in the meeting hold on **31.01.2017** conducted at Madras Medical College, Chennai 3

- | | |
|---|---------------------|
| 1.Dr.C.Rajendran, MD., | :Chairperson |
| 2.Dr.M.K.Muralidharan,MS.,M.Ch.,Dean, MMC,Ch-3 | :Deputy Chairperson |
| 3.Prof.Sudha Seshayyan,MD., Vice Principal,MMC,Ch-3 | : Member Secretary |
| 4.Prof.B.Vasanthi,MD., Prof.of Pharmacology.,MMC,Ch-3 | : Member |
| 5.Prof.S.Suresh,MS, Prof. of Surgery,MMC,Ch-3 | : Member |
| 6.Prof.N.Gopalakrishnan,MD,Director,Inst.of Nephrology,MMC,Ch | : Member |
| 7.Prof.S.Mayilvahanan,MD,Director, Inst. of Int.Med,MMC, Ch-3 | : Member |
| 8.Tmt.J.Rajalakshmi, JAO,MMC, Ch-3 | : Lay Person |
| 9.Tmt.Arnold Saulina, MA.,MSW., | :Social Scientist |

We approve the proposal to be conducted in its presented form.

The Institutional Ethics Committee expects to be informed about the progress of the study and SAE occurring in the course of the study, any changes in the protocol and patients information/informed consent and asks to be provided a copy of the final report.

Member Secretary - Ethics Committee


MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE
CHENNAI-600 003

Urkund Analysis Result

Analysed Document: suganya.docx (D42371012)
Submitted: 10/10/2018 1:53:00 PM
Submitted By: suganya19922009@gmail.com
Significance: 4 %

Sources included in the report:

Postpartum urinary retention following vaginal delivery version 1 Joanna Rothman.pdf (D21389782)
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4195322/>
<https://rcpi-live-cdn.s3.amazonaws.com/wp-content/uploads/2018/06/UR-guidelines-for-clinical-care-pathway-17.05.18.pdf>
https://www.researchgate.net/publication/13715603_Effect_of_the_Duration_of_Labor_on_Postpartum_Postvoid_Residual_Bladder_Volume
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4715845/>
https://www.researchgate.net/publication/49660441_Postpartum_voiding_dysfunction_and_urinary_retention

Instances where selected sources appear:

20

Keywords

PPUR - Post Partum Urinary Retention

OVERT

COVERT

<150ml

>150ml

Ultrasound

Catherisation

Vaginal delivery

Duration of Labour

Perineal Trauma

Episiotomy

Residual Bladder volume