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■ Original Research Article

# Pre-Operative Urethral Length and Occurrence of Urinary Incontinence Following Vesico-Vaginal Fistula Repair

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## ABSTRACT

**Background**: The study was carried out to examine the relationship between pre-operative urethral length and urinary incontinence following vesico-vaginal fistula repair. **Methodology:** It was a retrospective case-control study among 23 women who had closed fistula with post-repair incontinence as cases and 32 women who were completely dry as controls. The women had their urethral lengths determined before surgery and were examined for stress incontinence after. Association between categorical variables was determined using Chi square while the t-test was used to compare the mean urethral length of the cases and controls. A P-value of <0.05 was significant. **Results:** Women aged 50 years and above had the highest risk of post-repair incontinence. ($X^2$ =9.546, P=0.023). A higher proportion of women who had vaginal delivery developed post-repair incontinence compared with those who had caesarean section ($X^2$ =7.3218, P=0.007). The mean pre-operative urethral length among the cases was 1.84±1.22cm while that among controls was 3.52±0.50cm. This difference was statistically significant. (P<0.0001, T=7.0125, SEM 0.239). **Conclusion:** Reduced pre-operative urethral length, age 50 years and above and vaginal delivery are all associated with post-repair urinary incontinence.

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## INTRODUCTION

Obstetric fistula is a serious reproductive health problem seen among women in the developing world.[1,2] Surgical repair remains the mainstay of treatment.[3,4] Post-repair urinary incontinence is one of the complications of obstetric fistula repair and it is an enormous challenge to fistula surgeons all over the world.[5,6,7] This is because the women continue to experience the shame and

embarrassment of leakage of urine even after a successful fistula closure and thus feel that little or nothing has been achieved.

Urinary continence depends on the urethral support, the internal and external urethral sphincters all acting to ensure continence especially when there is an increased abdominal pressure.[8] The urethral support comprises the anterior vaginal wall, the endopelvic fascia and the levator ani. The internal urethral sphincter which is continuous with the detrussor is made up of smooth muscles while the external urethral sphincter which is made up of striated muscle contains fibres that surround both the urethra and the vagina.[9]

Vaginal delivery has been associated with reduced urethral closure pressure from denervation.[10] Following the development of obstetric fistula, which most commonly results from prolonged obstructed labour, there are likely to be more severe nerve damages. One or more parts of these components of the continence mechanism are commonly disrupted anatomically due to injuries sustained at childbirth. These injuries include, but are not limited to, deficient anterior vaginal wall, injury to the pudendal nerve, denervation of the levator ani, ischaemic necrosis of the urethra and bladder, loss of detrussor muscle, urethral transaction, urethral avulsion, weakening of the bladder neck and reduced bladder capacity.

The length of the urethra plays a vital role in continence. Pre-operative urethral length in obstetric fistula patients is believed to be a factor in the occurrence of post-operative urinary incontinence.[6] Hence, urethral length is routinely measured during the pre-operative assessment of fistula patients to enable optimal preparations for repair as well as provide a prognosis for the patient. However not all women with post-operative residual incontinence had reduced urethral length pre-operatively as the surgical procedure itself may cause of post-operative residual incontinence. Also, it is possible that childbirth injuries affecting the urethra manifest through other mechanisms besides shortening of the urethra.

It is generally known that women with short urethras are more likely to develop of post-operative urinary incontinence. This relationship however remains to be documented in this environment as there are other possible mechanisms of the incontinence, including the surgery. The study was therefore carried out to document the association between pre-operative urethral length and post-operative urinary incontinence among fistula patients managed at the National Obstetric Fistula Centre, Abakaliki.

## METHODOLOGY

It was a retrospective case-control study. Ethical approval was obtained from the Research and Ethics Committee of the Institution. Medical records of 55 women were retrieved for the study. They comprised 23 women who developed post-repair urinary incontinence after successful fistula closure as cases and 32 women who were completely dry as controls. Information on socio-demographic characteristics, obstetric history, examination findings such as urethral length, bladder depth and outcome of repair were obtained and entered into a pre-designed and validated structured proforma. Data was analysed using SPSS Version 20. Results were presented in tables. Frequency and proportions were used to describe categorical variables while mean and standard deviation were used to describe continuous variables. Association between urethral length and categorical variables was determined using the Chi square test. A t-test was also used to compare the mean urethral length of the cases and controls. A P-value of $<0.05$ was considered statistically significant.

Urethral length was measured in the examination theatre with the woman in lithotomy position. Adequate lighting was ensured. The vulva was swabbed with antiseptic solution. The labia majora was parted to expose the external urethral meatus. Appropriate size of Foley catheter was inserted into the urethra and advanced into the bladder. The balloon of the catheter was inflated with 5ml of sterile water. The catheter was gently withdrawn until a resistant was felt. The thumb and index fingers were applied on the catheter at the level of the external urethral meatus. The balloon was deflated by an assistant and catheter was removed with the examiner holding the catheter with the thumb and index finger. The balloon (outside the bladder) was inflated again by an assistant. The distance between the fingers of the examiner and the proximal end of the balloon was measured as the urethral length using a disinfected flat metallic metered rule on the centimeter portion.

The women were examined 14 days after surgery just before discharge. An assessment of closed fistula was made following a negative dye test. Obvious leakage of urine through the urethra or a positive cough impulse indicated post-repair residual urinary incontinence.

## RESULTS

The demographic and obstetric characteristics of the women are shown in Table 1.

Table 1 Demographic and obstetric characteristics

| Parameter | Frequency (%) |
|---|---|
| Age (years) | |
| <30 | 18 (32.7) |
| 30-39 | 19 (34.5) |
| 40-49 | 10 (18.2) |
| 50 & above | 8 (14.5) |
| Parity | |
| 0-1 | 20 (36.4) |
| 2-3 | 15 (27.3) |
| 4-5 | 13 (23.6) |
| >5 | 7 (12.7) |
| Duration labour | |
| <24 hours | 16 (32) |
| ≥24 hours | 34 (68) |
| Mode of delivery | |
| Vaginal | 26 (51.0) |
| CS | 25 (49.0) |

The mean parity of the women was 3.1±2.4 (Range: 0-10). The mean age of the cases was 3.3±2.7 while that of the control was 3.0±2.1. Thirty-five women (80%) were multiparous. Thirty-four women (68%) were in labour for 24 hours and beyond while 26 women (51%) delivered vaginally.

Table 2 Age and mode of delivery

| Parameter | Cases | Controls | |
|---|---|---|---|
| **Age (years)** | | | |
| <30 | 6 | 12 | $X^2$ = 9.546 |
| 30-39 | 5 | 14 | P=0.023 |
| 40-49 | 5 | 5 | |
| 50 & above | 7 | 1 | |
| **Mode of Delivery** | | | |
| Vaginal delivery | 16 | 10 | $X^2$ 7.3218 |
| Caesarean section | 6 | 19 | P=0.007 |

The mean age of the women was 35.4±11.8 years (Range: 16-60 years). The mean age of the cases was 39.2±13.8 years while that of the control was 32.7±9.5 years. Nineteen women (34.5%) were aged 30-39 years. The relationship between age and the occurrence of residual urinary incontinence is shown in table 2. Compared with other age groups, women aged 50 years and above had the highest risk of developing post-operative urinary incontinence after a successful fistula closure. This was statistically significant. ($X^2$ =7.3218, P=0.0068).

The relationship between mode of delivery and the occurrence of residual urinary incontinence is also shown in table 2. A higher proportion of women who had vaginal delivery developed post-repair urinary incontinence after a successful fistula closure compared with those who had caesarean section ($X^2$ =7.3218, P=0.0068).

Table 3 Descriptive statistics of urethral length measurement

| | N | Min | Max | Mean | SD |
|---|---|---|---|---|---|
| UL (Cases) | 23 | 0 | 4 | 1.84 | 1.22 |
| UL (Control) | 32 | 2 | 4 | 3.52 | 0.50 |

P<0.0001, T=7.0125, SEM 0.239
*UL Urethral length

Pre-operative urethral length measurements of both the cases and controls are shown in table 3. The mean pre-operative urethral length among the cases was 1.84±1.22cm (Range: 0-4.0cm). The mean pre-operative urethral length among the controls was 3.52±0.50cm (Range: 2.0-4.0cm). (P<0.0001, T=7.0125, SEM 0.239). This difference was statistically significant.

## DISCUSSION

This study examines the relationship between pre-operative urethral length and the occurrence of post-operative urinary incontinence among women who had successful fistula repair. Demonstrating the structure and the function of the urethra is a vital component of the pre-operative assessment of fistula patients to enable optimal preparation as well as provide a basis of counseling on prognosis. It is therefore relevant to examine and document the

association between the length of the urethra and surgical outcome in our environment. This is because for the patients, urinary incontinence after closing a fistula is as heart-breaking as a failed fistula repair. The women studied included both reproductive-age and postmenopausal women and most of them were multiparous. This is because obstetric fistula is seen across a wide age bracket and can occur after previous normal deliveries. Similar age range and parity have been previously reported.[4] Many studies however report obstetric fistula as a condition seen mainly among teenagers, younger women and primiparas. [11-13]

Women aged 50 years and above had the highest risk of developing post-operative urinary incontinence after a successful fistula closure. This means postmenopausal women are at greater risk of post-repair incontinence when compared with younger women. This is likely a result of weakness of the supports of the urethra from low oestrogen levels after menopause. Urinary incontinence is a known problem of postmenopausal women.[14] Age older than 50 years at the time of repair has been reported as a risk factor of residual incontinence after fistula repair.[15] Surgery in postmenopausal women should therefore include assessment of the strength of the urethral tissues and introduction of reinforcement if necessary. Introduction of local oestrogen therapy may also be considered if any weakness is noted.[16] More studies are needed to determine the role of oestrogen.

A higher proportion of women who had vaginal delivery developed post-repair urinary incontinence after a successful fistula closure compared with those who had caesarean section. Vaginal delivery has been associated with reduced competence of the urethral sphincters from denervation of the pelvic floor muscles.[10] Vaginal delivery was shown to double the risk of stress incontinence compared with caesarean section in a Finnish study.[17] The finding also agrees with the report from the Brazilian study that associated stress urinary incontinence with labour and vaginal delivery.[18] Following the development of obstetric fistula from prolonged obstructed labour, more extensive disruptions in the structure and function of the urethral supports are expected. Caesarean section is therefore important not only in preventing the occurrence of obstetric fistula but also in preventing associated urinary incontinence.

The mean pre-operative urethral length among the women who developed residual incontinence was significantly shorter than that of the controls. Reduced urethral length is a cause of urinary incontinence. The finding is in keeping with previous studies that associated urethral length with stress urinary incontinence. [15,19,20] When urethral length is short pre-operatively, additional measures are needed during fistula surgery to reduce the risk of incontinence. In fistula surgery therefore, the use of techniques to augment the urethral length appears justifiable. Other factors besides urethral length such as vaginal scarring, previous repair, large fistula size, circumferential defect and reduced bladder capacity have been shown result in incontinence after fistula closure. [5,15,20]

The study is however limited by its small sample size and the retrospective nature. We recommend prospective studies with large number of subjects to further examine these relationships. The roles played by other components of the continence mechanism on post-repair urinary incontinence in this environment also need to be elucidated using large prospective studies.

In conclusion, reduced pre-operative urethral length predisposes to post-operative urinary incontinence. Age 50 years and above and vaginal delivery are associated with reduced pre-operative urethral length. The use of techniques to augment the urethral length during fistula repair is justifiable.

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