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***Research Article***

# WHY GENDER REASSIGNMENT IN CONGENITAL APHALLIA?

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## ABSTRACT
Congenital aphallia or penile agenesis is a complex urogenital malformation and an extremely rare condition in the medical literature with reported incidence of 1 in 30 million live births. The condition is apparent at birth and is almost never missed. Objectives behind the study were to present the management and solve the dilemma with congenital aphallia. We present a retrospective study of three cases with congenital aphallia. The patients presented between 2008 and 2014. Our initial infant had female sex reassignment, which was lost to follow-up. Learning from the previous experiences, we decided to rear the next two infants as male. Obstructive uropathy was managed with early urethral transposition in the second and third case, while vesicostomy was performed in the first case. Both second and third patients underwent urethroplasty, they are passing urine from the urethral meatus situated at the pubis. All procedures were undertaken only after thorough counselling and discussion with the parents. Congenital aphallia requires multistage management. Obstructive uropathy should be managed with early urethral transposition or urethral advancement techniques. In the second stage, the meatal opening may be advanced near the pubic region by creating Byer's flap urethroplasty. It is very important to propose early sex reassignment. Gender reassignment must be individualized according to age at presentation, rearing sex of child and psychological evaluation of child and acceptability of the family. Present trend is towards male sex reassignment.

***Keywords:*** *Aphallia, Male, Urethral Transposition, Phalloplasty, Sex Reassignment*

## INTRODUCTION
Aphallia is congenital absence of penis in a genotypic male. Karyotyping is typically XY (Gautier *et al.*, 1981). It is derived from the Greek word, "phallia" which means penis or clitoris (Kessler and McLaughlin, 1973). Aphallia was first described by Imminger in 1853 (Soderdahl *et al.*, 1972). It has a reported incidence of one in 10-30 million live births and is an extremely rare and complex urogenital malformation with less than 100 cases reported in the literature (Kessler and McLaughlin, 1973; Soderdahl *et al.*, 1972; Berry *et al.*, 1984). It usually coexists with other anomalies which may be incompatible with life. Clinically the penis is absent, scrotum is well developed, usually both the testes are descended and urethra of an affected child opens adjacent to the anus and in some cases within the rectum. Aphallia or penile agenesis is a rare form of presentation of ambiguous genitalia, with absence of all three components namely both the corpora cavernosa and corpus spongiosum (Soderdahl *et al.*, 1972). Management of neonates with congenital aphallia poses a challenge to the treating surgeon as it has profound urological and psychological consequences. We report our experiences with 3 additional patients, and discuss the modalities and dilemma in the management of congenital aphallia. Rarity of this congenital anomaly justifies publication of its literature.

### *Objective*
To present the management and solve the dilemma with congenital aphallia.

## MATERIAL AND METHODS
We present a retrospective study of three cases with congenital aphallia. The patients presented between 2008 and 2014. They were studied for the age at diagnosis, presenting symptoms, associated anomalies, preoperative work-up, operative procedures, gender reassignment and outcome.

***Research Article***

***Clinical Cases***

*Case 1*

We are hereby reporting the 1st case of aphallia, in whom female sex reassignment was performed. A 3.3 kg, 4-months-old child was brought to the paediatric surgical department by mother with complaints of absence of penis since birth and passing urine per rectally (Figure 1). Patient was born full term with normal vaginal delivery. There was absence of consanguinity among parents, no family history of other congenital anomaly. The child's mother was a young normal lady with no history of use of any drugs or exposure to x-ray during pregnancy and the mother was non-diabetic. Examination revealed a well child with an absent penis. Palpation revealed the presence of the gonads inside the scrotum. The anus was in normal position. There was an absence of urethral meatus in the perineum. Laboratory investigations and ultrasound pelvis & scrotum were normal and were consistent with male internal genitalia. There was bilateral mild to moderate hydronephrosis. The treatment options were discussed with parents and female gender reassignment was decided. Vesicostomy and bilateral orchiectomy was performed. Urethral perineal transposition and feminizing genitoplasty was intended, but the patient was lost to follow up.

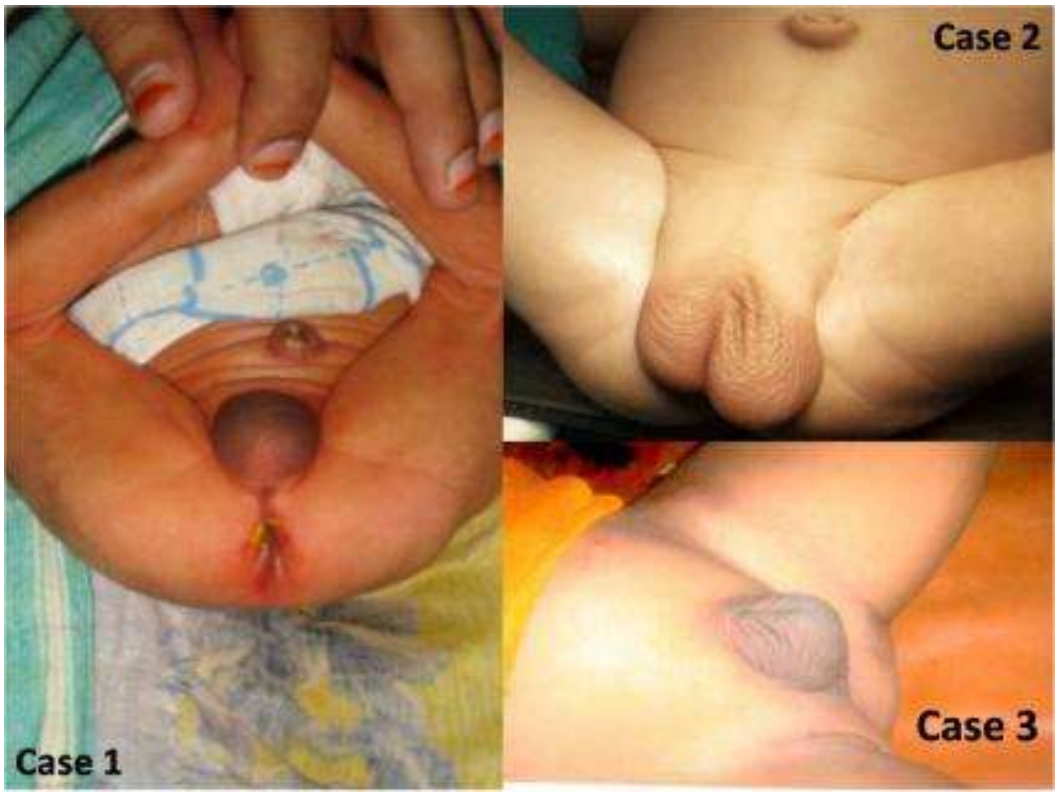


**Figure 1: Showing absence of phallus with well developed scrotum in case 1, case 2 and case 3. Absence of urethral meatus in the perineum with peri-anal ammoniacal dermatitis in case 1**

*Case 2*

We are hereby reporting the 2nd case of aphallia which affected a neonate whose parents have decided to keep the male sex.

A 28-day-old child weighing 2.7 kg was brought to the paediatric surgery OPD with absence of penis since birth. Patient was born full term of an uncomplicated vaginal delivery. There was absence of consanguinity among parents, and the mother was 20-year-old non-diabetic. On examination, the child was neither jaundiced nor pale. The scrotum was well developed and both the testes were normally descended (Figure 1). Anal opening was anteriorly placed and a pinhole urethral opening was visible in the anterior anal verge under a skin tag at 12 O'clock position and during examination squirt of urine was

seen coming from the opening (Figure 2A). There was no other identifiable external anomaly. Laboratory investigations were normal. Ultrasound abdomen & pelvis showed gross hydrouretronephrosis on right side with mild hydronephrosis on left side. There were no female internal genitalia. Ultrasound scrotum showed presence of both normal testes & epididymes. Karyotyping was not done in view these findings and also because it was unavailable in the institution. Cystourethrography was done by cannulating the urethral opening (Figure 2B) with 24 gauze intravenous cannula, which showed absence of smooth outline of the urinary bladder (Figure 2C). Contrast enema was then performed to rule out any associated lower gastrointestinal tract abnormality (Figure 2C). The treatment options were discussed with parents and male gender assignment was decided. Initial management consisted of separation of urethral meatus from the anal verge and to prevent back pressure on kidneys due to pin point urethral meatus. Urethral transposition, and anoplasty was performed in the first stage (Figure 2D and Figure 3A).

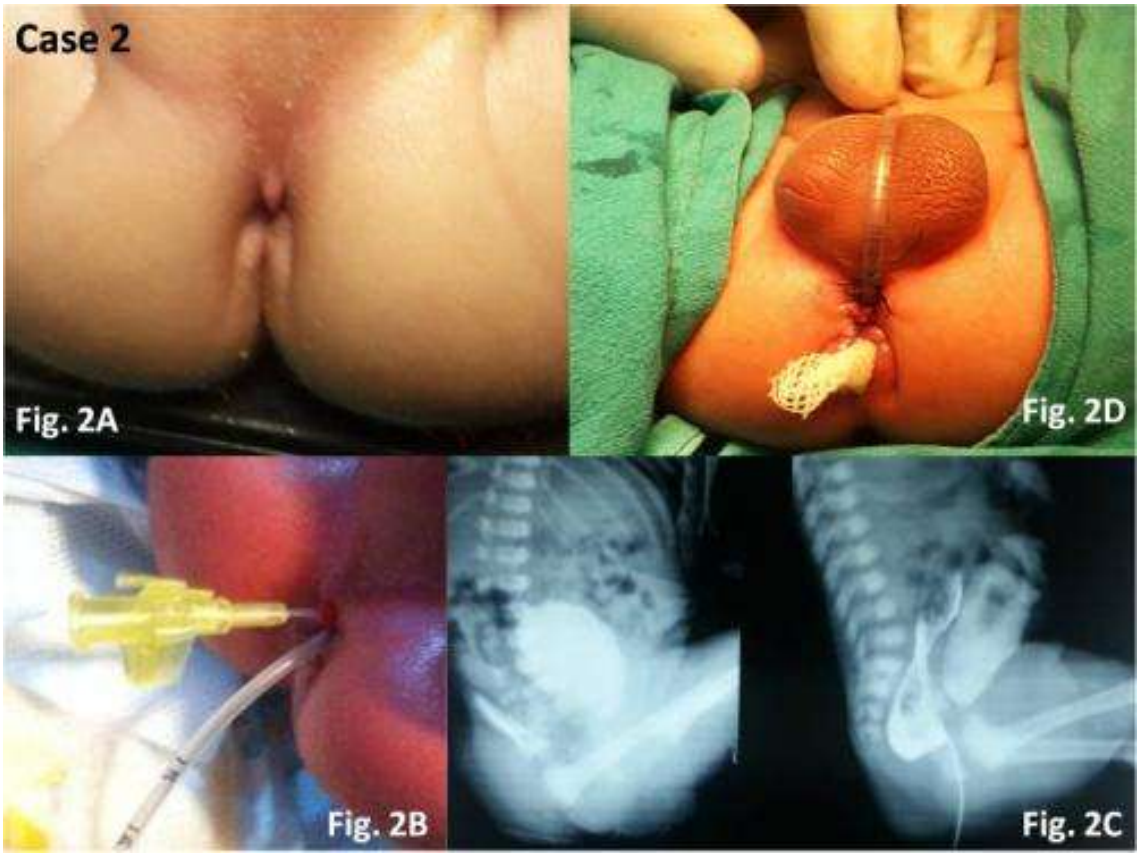


**Figure 2: Showing on Top left (Figure 2A): Anteriorly placed anal opening and a pinhole urethral meatus, visible in the anterior anal verge under a skin tag. Bottom left (Figure 2B): Urethral meatus and anus being cannulated. Bottom right (Figure 2C): Cystourethrography showing absence of smooth outline of the urinary bladder, Contrast enema showing absence of any associated lower gastrointestinal tract abnormality. Top right (Figure 2D): Anterior transposition of the urethra with anoplasty**

In the second stage, the meatal opening was further advanced up to the pubic region by creating Byer's flap (Figure 3B). At the beginning, the urethral tube was constructed up to mid scrotum (Figure 3C), it was further pulled up to the pubic region by making subcutaneous tunnel between two scrotal halves in the midline (Figure 3D). Strengthening of the perineal urethra was performed by tunica vaginalis flap (Figure 3E). The tube was fixed at pubic region (Figure 3F). The neonate had smooth post-operative period. Male genital reconstruction is intended for the later date and patient is under follow up.

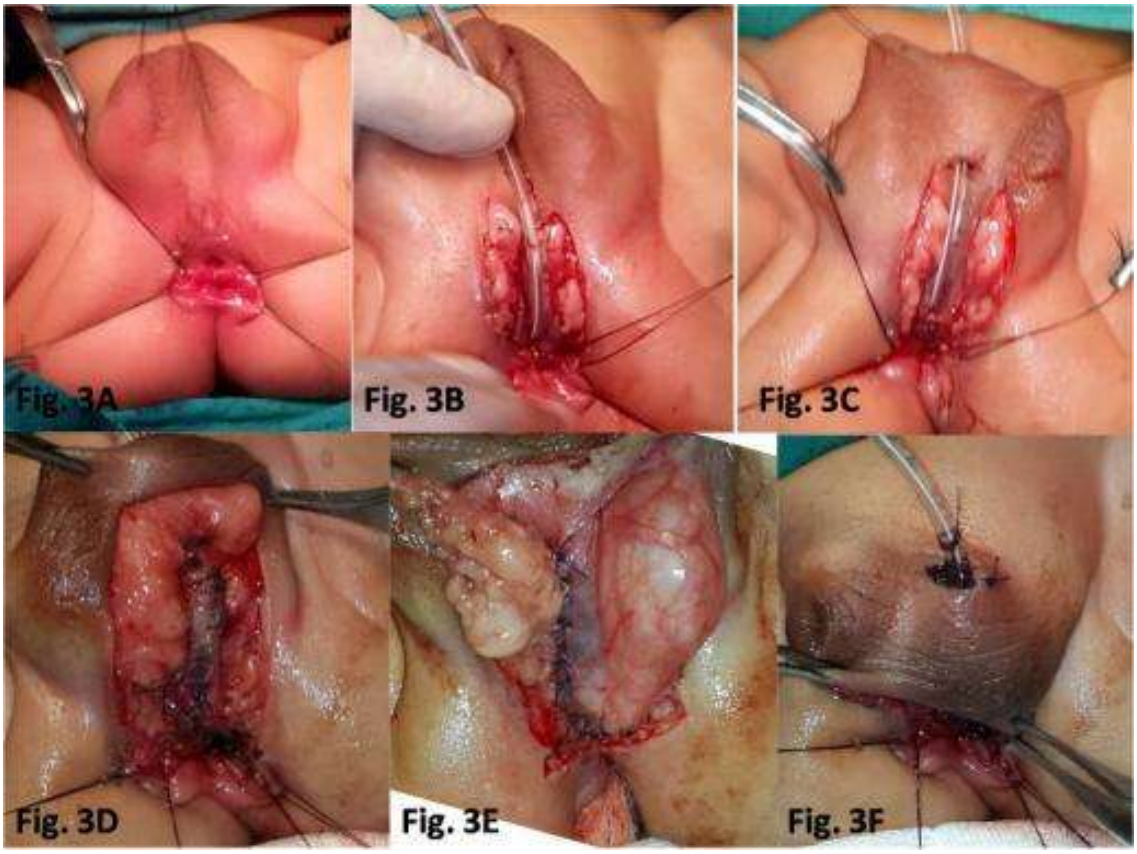


**Figure 3: Showing urethral transposition (Figure 3A), creation of Byer's flap (Figure 3B), urethral tube constructed up to mid scrotum (Figure 3C), urethral tube in subcutaneous tunnel between two scrotal halves in the midline (Figure 3D), tunica vaginalis flap (Figure 3E). The tube fixed at pubis (Figure 3F)**

*Case 3*

A 5.9 kg, 5-month-old child was brought to the out-patient department by mother with absence of penis since birth and passing urine per rectally. Antenatal history was unremarkable. Perineal examination revealed an absent penis and testes inside the scrotum (Figure 1). The anus was anteriorly placed. There was an absence of urethral meatus in the perineum. Investigations were consistent with male internal genitalia. Renal functions were deranged. Mild hydronephrosis was present bilaterally. After thorough counselling with parents, male gender assignment was decided. After preoperative optimisation, in the first 1st stage, urethro-rectal disconnection was performed by pre-anal anterior coronal, urethral perineal transposition and anoplasty was performed. In the 2$^{nd}$ stage, urethroplasty was performed similar to the technique performed in the 1$^{st}$ case. Patient post-operatively and is under follow up. He has been referred to plastic surgery department for phallus reconstruction.

## RESULTS

Results of the study have been summarised in the Table 1 and Table 2. Our initial infant had female sex reassignment, which was lost to follow-up. Learning from the previous experiences, we decided to rear the next two infants as male and thus male gender assignment was done. Obstructive uropathy was managed with early urethral transposition in the second and third case, while vesicostomy was performed in the first case. Both second and third patients underwent urethroplasty, they are passing urine from the urethral meatus situated at the pubis. All procedures were undertaken only after thorough counselling and discussion with the parents.

**Table 1: Characteristics, surgical approach and gender assignment of patients with congenital aphallia**

| No | Age | Associated anomalies | Preoperative status | Investigations | Surgical procedure | Gender assignment | Future planning |
|---|---|---|---|---|---|---|---|
| 1 | 4-months | Bilateral mild to moderate hydronephrosis | Good | Ultrasound study | Bilateral orchiectomy, vesicostomy | Female | Feminizing genitoplasty (lost to follow up) |
| 2 | 1-month | Gross hydrouretronephrosis-right, mild hydronephrosis-left side | Hypocalcemic seizures | Cystourethrogram Contrast enema Ultrasound study | Step1: Urethral transposition and anoplasty. Step2: Urethroplasty | Male | Phalloplasty |
| 3 | 5-months | Mild hydronephrosis bilaterally | Deranged RFT. | Contrast enema Ultrasound study | Step1: Urethro-rectal disconnection, urethral perineal transposition and anoplasty Step2: Urethroplasty | Male | Phalloplasty |

**Table 2: Classification of patients on the basis of relationship of urethral meatus with anal sphincter, according to the Skoog and Belman**

| Case no. | Urethra opening (Skoog and Belman classification) | Anal opening |
|---|---|---|
| 1 | Presphincteric (rectum) | Normally placed |
| 2 | Postsphincteric (anterior and verge) | Anteriorly placed |
| 3 | Presphincteric (rectum) | Anteriorly placed |

## DISCUSSION

Aphallia is related to result from the non-formation of the fetal genital tubercle (phallic tubercle) or its failure to develop or failure in caudal migration of the urogenital sinus between the third and sixth weeks of embryonic development (Chibber *et al.*, 2005; Netter *et al.*, 2002; Biswal, 2013). During the third week of intrauterine life, mesenchymal cells originating from the region of primitive streak migrate around the cloacal membrane and form a pair of slightly elevated folds, known as cloacal folds. Cranially they fuse to form a small bud called, the genital tubercle. This genital tubercle, formed from proliferating mesenchyme in the ventral part of the caudal aspect of embryo is responsible for the development of urinary and reproductive organs and eventually forms the phallus. The development of penis is dependent upon dihydrotestosterone (DHT) from the testis. The genital tubercle is sensitive to DHT and rich in 5-alpha-reductase. At 9 weeks of gestational age, under the influence of testosterone, the genital tubercle starts to lengthen and becomes recognizable either as clitoris or penis. Hence, the amount of fetal testosterone present after the second month is a major determinant of phallus size at birth. The definitive urogenital sinus in aphallia ends in the perineum without proliferating and the urethra of an affected child

as a result, opens in the perineum or ectopically, near the anal border or in the anorectum (Chibber *et al.*, 2005; Netter *et al.*, 2002; Biswal, 2013).

Aphallia may be a part of major disturbance of caudal mesoderm when it presents along with scrotal hypoplasia, absent raphe, scrotal defects and renal anomalies (Chibber *et al.*, 2005; Netter *et al.*, 2002; Biswal, 2013; Evans *et al.*, 1999). It may be a localised malformation of the genital tubercle (Evans *et al.*, 1999). Therefore, it is classified into two groups, either a severe form (16%) & a milder form (72%) (Evans *et al.*, 1999). In our case, all the patients belonged to the milder form with fewer associated defects. Aphallia may be associated with pregnancy complicated by poorly controlled maternal diabetes, while our in our cases, there was no such finding (Gripp *et al.*, 1999).

***Management***

Presentation is usually in the neonatal period, however, delayed presentation has been reported in the literature (Sarin and Sinha, 2003). It is characterised by conspicuous absence of the penis, the scrotum is usually normally developed, testes are normally developed with normal testosterone production in most of the cases. The anus may be anteriorly displaced (Gautier *et al.*, 1981; Shamsa *et al.*, 2008; Reiner, 2004). Aphallia is associated with fistulous communication between the urinary tract and rectum. According to the Skoog and Belman classification (1984), on the basis of relationship of urethral meatus with anal sphincter, aphallia is categorised into 3 types, postsphincteric, presphincteric and urethral atresia (Skoog and Belman, 1989). It is one of the most important classifications of aphallia, as it is not only an anatomical, but also prognostic classification, as well as it guides the initial surgical management. Postsphincteric is the most common (60%), with urethral opening near the anterior anal verge under a skin tag as in our 2$^{nd}$ case (33.3%) or any point on the perineum in midline, over pubis or anterior scrotum. Less commonly, it opens into the rectum, presphincteric (28%) as in our 1$^{st}$ and 3$^{rd}$ cases (66.6%), with prostatorectal (urethrorectal) fistula. Third type is urethral atresia with vesicorectal fistula (12%) (Skoog and Belman, 1989). More proximal urethral meatal openings are associated with higher mortality rates, likely related to severe form of Aphallia and higher incidence of associated anomalies (Evans *et al.*, 1999).

Patient should ideally be genetically evaluated at birth, while in our resource limited set-up it couldn't be carried out. Evaluation for frequently associated other malformations which is present in > 50% of cases is important (Evans *et al.*, 1999; Skoog and Belman, 1989). When associated with anomalies incompatible with life such as cardiopulmonary anomalies, they are delivered as stillbirth. Genitourinary system anomalies are commonly seen, examples are renal agenesis, hypoplastic kidneys, cystic kidneys, hydronephrosis, abnormal renal rotation, pelvic kidneys, horseshoe kidneys, vesicoureteral reflux, hypoplastic bladder, vesicocolic fistula, blind urethra, agenesis of prostate and seminal vesicles, cryptorchidism, hydrocele and inguinal hernia (Shamsa *et al.*, 2008; Johnston *et al.*, 1977). Anorectal anomaly in the form of anteriorly placed anus is usual association as seen in two (66.6%) of our cases. Other GI anomalies are megacolon, tracheoesophageal fistula, annular pancreas and hepatomegaly. Musculoskeletal anomalies, dental malalignment, saddle nose, notched teeth, pigeon chest, hemivertebrae, clubbed feet simian creases, shortened fore-arms, chromosome abnormalities, mosaicism, anencephalia, unilateral umbilical artery, accessory ear lobes/low set ears have been reported (Evans *et al.*, 1999; Shamsa *et al.*, 2008; Skoog and Belman, 1989; Johnston *et al.*, 1977; Biswal, 2013).

It must be differentiated from severe hypospadias or epispadias, concealed penis or micropenis, intrauterine penile amputation and intersex states (Soderdahl *et al.*, 1972; Elder, 2007). Cystourethrography and MRI are useful investigations to look for any associated anomaly as well as defining the anatomy (Goenka *et al.*, 2008). MRI is a difficult preposition in neonates as far as our set-up is concerned.

**Treatment** of aphallia, particularly in a newborn is a challenge and poses dilemmas both for the parents and treating team, which must include paediatric surgeon, paediatrician, endocrinologist, geneticist and psychologists. There is in-utero gender imprinting of brain and long term psychological effects of gender conversion (Diamond and Sigmundson, 1997). Patient requires multistage and multidisciplinary treatment.

**Immediate management** may include prevention of infravesical obstructive uropathy and treatment of life threatening associated anomalies. Obstructive uropathy should be managed with early urethrostomy or urethral transposition or urethral advancement (improves micturition mechanics). The neonate should not be discharged too early without a urethrostomy, as obstructive uropathy may lead due to chronic renal failure (Bangroo *et al.*, 2005). The urethro-rectal disconnection (dismantling of the urethra from the anorectum and placing it in the perineum) hence forms an integral part of the management, which can be performed by pre-anal anterior coronal approach (Bajpai, 2012). In the second stage, the meatal opening may be advanced near the pubic region by creating Byer's flap urethroplasty (Figure 4).

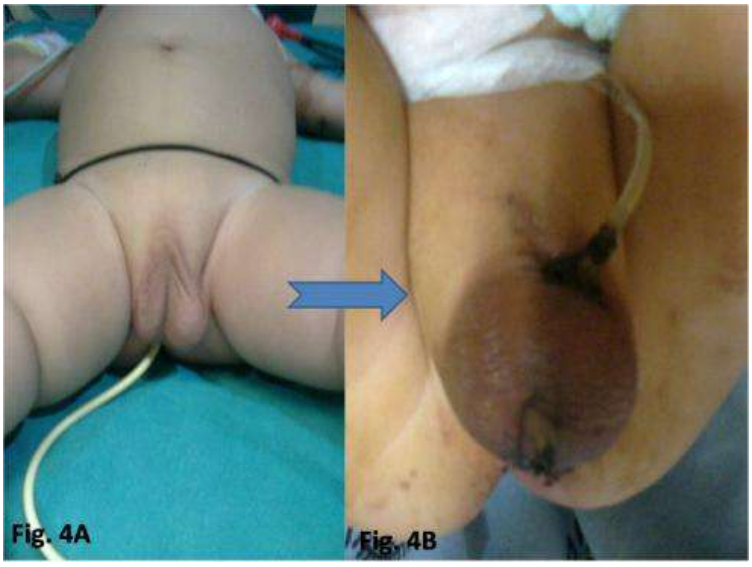


**Figure 4: Patient of aphallia at the time of presentation (Figure 4A), after second stage, meatal opening at the pubic region with feeding tube in place (Figure 4B)**

***Gender Reassignment***

Gender reassignment is ideally done in the neonatal period, otherwise it is individualized according to age at presentation, sex of rearing, psychological evaluation of child and decision of the family (Chibber *et al.*, 2005). Gender reassignment and surgical intervention, both classical and newer treatment approaches (phallus reconstruction) should be undertaken only after thorough discussion with the parents with respect to future socio sexual aspects, fertility of child and if they are not sure of the gender, they may be given time to think over it (Bangroo *et al.*, 2005). Their decision should be respected.

In the past, the recommended surgical treatment of this genetically male infant was early sex reassignment to the female gender. Justification given was that, it was considered to be more troublesome problem in a male. This classical management consists of urethral perineal transposition, early bilateral orchiectomy with preservation of the scrotal skin, and feminizing genitoplasty in neonatal period or at the time of presentation. Early reconstruction helps the family to accept the child's gender status. Vaginoplasty is undertaken at the time of puberty along with oestrogen therapy, for breast development and other female secondary sexual characters (continued life-long) (Glüer *et al.*, 1998; Stolar *et al.*, 1987). Although it's relatively easier to perform than phalloplasty and the child can have a normal sexual life in the future, but she will neither menstruate nor become fertile. Other demerits being, the intake of life-long hormones to maintain her feminity, its financial implications and side effect of drugs (Tiwari, 2003).

The current trend is to rear these children as males (Lumen *et al.*, 2008; Meyer-Bahlburg, 2005). Intra-uterine and postnatal effects of androgens on brain cause a male-typical shift in terms of psychosocial and psychosexual development, resulting in gender dysphoria later in life. The concept of male "core gender identity," or "a congenital, perhaps inherited biological force" in the production of gender identity has been proposed (Stoller, 1964). It is believed that the anatomic penis is not essential to the "sense of

maleness" (Stoller, 1964; Rosenblum and Turner, 1973). The intercourse and ejaculation by stimulating the dorsal portion of scrotum and pubic area has been reported in one case of congenital aphallia (Rosenblum and Turner, 1973).

Male gender assignment involves reconstructing a normally functioning penis which is aesthetically acceptable, sexually functional (ability to penetrate), which provides tactile and erogenous sensation, adequate reproductive function and the ability to urinate standing (Bluebond-Langer and Redett, 2011). Ideally phalloplasty should be completed in one to two operations with minimal donor site morbidity (Bluebond-Langer and Redett, 2011).

A detailed discussion regarding the techniques of phallic reconstruction is beyond the scope of this article, but we would like to sensitize our colleagues, particularly, the residents. Phallic reconstruction is based on the both local pedicled tissue as well as free tissue transfer (Bluebond-Langer and Redett, 2011). Reconstruction in infancy with the help of quadrangular scrotal flap can be performed, which serves as a temporizing procedure which may see the child through early childhood, until puberty (Bajpai, 2012). Postponing surgery till post-pubertal period adds to parental anxiety, affects psychosocial development of the child who continues to pass urine per rectum (Bajpai, 2012). Other options are radial forearm, the anterolateral thigh, the scapula and latissimus, and the fibula free flaps, as well as local rotational flaps from the abdomen, groin, and thigh (Bluebond-Langer and Redett, 2011). Radial artery-based free forearm flap (RFF) with the advantage of relative absence of hair in the graft (include a portion of the radius for rigidity) while pedicled anterolateral thigh flap (ALTF) has complication of tricholithobezoar formation (Chibber *et al.*, 2005; Bluebond-Langer and Redett, 2011; Descamps *et al.*, 2009).

In Indian subcontinent, unmarried male can live better than an unmarried female. There is a social bias against female gender, parents prefer to have boys rather than girls, even when the boy presents a complex genitourinary malformation. There is stigma for infertile females, particularly in Rajasthan. The parents are reluctant for female reassignment even if there is high failure rate when it comes to erectile function. At present, there is a shortage of literature regarding whether aphallic patients are capable of reproducing. Potentially they may be fertile, particularly with the techniques of in-vitro fertilization.

***Conclusions***

Congenital aphallia requires multistage management. Obstructive uropathy should be managed with early urethral transposition or urethral advancement techniques. In the second stage, the meatal opening may be advanced near the pubic region by creating Byer's flap urethroplasty. It is very important to propose early sex reassignment. Gender reassignment must be individualized according to age at presentation, rearing sex of child and psychological evaluation of child and acceptability of the family. Present trend is towards male sex reassignment.

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