STRESS INCONTINENCE

by

LAXMI V. BAXI,* M.D., D.G.O., F.C.P.S., D.F.P.

The problem of stress incontinence came to the fore during the fifties. Despite the advances in modern medicine since then, there is still a controversy raging as regards its aetiology and the standard method of management.

Holland (1928) seems to have given the best definition of the condition till to-date. He states: "It is a condition, characterised by involuntary passage of small quantities of urine through an intact urethra on straining, coughing, sneezing, and in severe cases, even at rest.' Thus, it excludes other conditions with similar symptoms, e.g. vesico-vaginal fistula with a valvular opening, an ectopic ureter and urge incontinence.

There is a controversy regarding the appropriate nomenclature for this condition. Youssef (1960) calls it sphincter incontinence. This nomenclature emphasises 'sphincter weakness' as the essential aetiological factor, operating in all grades and varieties of the condition. However, anatomical studies have proved conclusively that internal vesical sphincter does not exist, although physiologically and functionally there is no doubt about its existence and competence. Besides, the word 'sphincter' is present in most of the languages in the world and is understood as such. This is not true for the word 'stress'. But, due to usage, the term 'stress incontinence' is still the most accepted one.

*Assistant Professor of Obstetrics and Gynaecology (post-partum programme), L. T. Municipal General Hospital, Sion, Bombay-22.

Received for publication on 13-6-72.

Incidence

The incidence of stress incontinence seems to be higher in the West. This problem is conspicuous by its absence in Indian literature. The higher incidence may be attributed to congenital weakness of the pubo-vesico-cervical fascia that is of ethnic significance. Newman and Northrup (1961) have given an incidence of stress incontinence as 34 per cent in 1,000 women attending gynaecological out-patient clinic. It was 15 per cent in the nulliparous and 43 per cent in the multiparous. However, Green (1968) came across very few nulliparous patients with stress incontinence. Bailey (1954) reported an incidence of 39 per cent in patients with prolapse. Francis (1960) found that the incidence was very high during pregnancy, 53 per cent in primiparae and 85 per cent in multiparae. The paucity of this condition in the Indian literature suggests that possibly our patients do not volunteer about this complaint per sé. Majority of these patients have associated uterine or vesical prolapse, indicating that injury to pubo-vesico-cervical fascia as a result of childbirth is the main aetiological factor responsible for stress incontinence.

Aetiological Classification of Stress Incontinence

Depending upon the basic cause responsible, stress incontinence can be classified as follow:

1. *Congenital*: An inherent weakness of the urethral musculature and the

pubo-vesico-cervical fascia may be responsible for this variety, seen in nulliparous women.

2. *Pregnancy and Puerperal*: This is the type most commonly encountered. Trauma to the so-called sphincter mechanism at the time of childbirth may lead to stress incontinence, either immediately or it may manifest at a later date. That seen during pregnancy may be as a result of laxity of tissues under the effect of progesterone.

In a postmenopausal woman, atrophy of the supports might also lead to stress incontinence. Other factors which predispose to stress incontinence are obesity and chronic pulmonary disease with constant severe cough.

3. *Post-operative*. Overzealous advancement of the bladder-base at the time of vaginal hysterectomy for prolapse, and Leforte's operation may lead to stress incontinence. Radical dissection of vesical supports at Wertheim's hysterectomy may result in stress incontinence. The problem which is quite often encountered in our country is that of a bladder-neck fistula following a difficult vaginal delivery. A repair of this vesico-vaginal fistula might leave behind a residual stress incontinence, which is a difficult and ungratifying problem.

Morbid Anatomy and Patho-physiology

So far as the aetiology of stress incontinence is concerned, all the theories revolve around the bladder neck region, it being the site of physiological sphincter. Of late, the cystourethrography has contributed much to its understanding. The following are the observations.

(1) Descent of bladder neck region in relation to pubic symphysis and funnelling of urethro-vesical junction.
(2) Shortening of urethra.
(3) Obliteration of posterior urethro-vesical angle.
(4) Pressure changes in the proximal third of the urethra.
(5) Axial rotation of the urethra.

Millin and Read (1948), Ball *et al* (1950) suggested descent of urethro-vesical junction as an aetiological factor responsible for stress incontinence. Lund *et al* (1959) using cine-radiography also observed the same. However, absence of stress incontinence in all cases of prolapse and cystocele, and at the same time, presence of stress incontinence without prolapse disprove this explanation. Jeffcoate and Roberts (1956) and Hodgkinson (1965) employing bead-chain technique of cystourethrography concluded that location of bladder neck and urethra with respect to pubic symphysis was not of direct importance.

Lapides (1944, 1960) attributed stress incontinence to a short urethral length. With the experience of cysto-urethrogram, a doubt has been raised about this aetiology (Green, 1962). Surgical correction of stress incontinence in spite of persistence of short urethral length and vice versa suggests that urethral length has little to do with the aetiology of stress incontinence. Hodgkinson (1963) who studied 105 patients and Low (1964), who studied 138 patients concluded that urethral length has no bearing on the problem of stress incontinence.

It may be mentioned here that correct measurement of the urethral length is by itself a problem. Lapides *et al* (1960) used a catheter with a balloon attached at the inner end. On giving a traction the balloon gets arrested at the bladder neck region and the distance between this bulb and the external urinary meatus gives an idea about the urethral length. However,

funnelling of bladder neck region might lead to telescoping of the balloon into the urethra, thus giving a urethral length, which is shorter than the actual length.

Gardiner *et al* (1961), using Lapides technique of use of simple catheter and cine-radiography attempted to correlate functional urethral length with the aetiology of stress incontinence. This concept of functional shortening of urethra was suggested by Lapides (1961) as well. He attributed shortening to peri-urethral fibrosis, which caused fixity of the urethra. Bennett *et al* (1970) claimed complete relief from stress incontinence in 32 out of 35 patients by mere distal lengthening. According to Green (1968), a truly short urethra of length of 2 cms. or less due to congenital malformation or surgical or obstetric trauma may be the cause of severe urinary incontinence. These patients have total urinary incontinence.

Use of metallic chain and dura-clip (Green, 1962) gives the correct idea about the urethral length, emphasising that there is no change in urethral length in patients with successful repair of stress incontinence.

Normal cystourethrogram in a woman reveals a flat bladder-base and a sharply defined posterior urethrovesical angle (90°-100°) with at least one-third of the bladder-base taking part in the formation of this angle. Patients with stress incontinence invariably show complete or nearly complete loss of this posterior urethrovesical angle with resulting funnelling and posterior descent of the vesical neck. Bailey (1954, 1956), Dutton (1960), Harer and Gunther (1965), Low (1964), Marchetti (1956), Pereyra *et al* (1967), Schonberg *et al* (1963) have observed the same. Jeffcoate and Roberts (1956) were the first to draw attention to urethro-vesical junction and proximal urethra to the continence mechanism.

There are various points which prove that obliterated posterior urethro-vesical angle is the cause responsible for stress incontinence.

A patient suffering from stress incontinence is in a preliminary phase of micturition act. A sudden rise in the intraabdominal pressure in these patients produces a transient picture similar to that caused by detrussor contraction. Elevation of bladder neck (Bonney's test, 1923, Read, 1950 and Marchetti's tests (1956) which temporarily prevents the escape of urine through the urethra ultimately is an attempt at correction of obliterated urethro-vesical angle. The postoperative cystourethrogram in patients operated for and cured of stress incontinence by Kelly's stitch (1911), Marshall-Marchetti (1949) operation or any other operative procedure shows restoration of posterior urethro-vesical angle.

The stress incontinence, which results following vaginal hysterectomy is on account of overzealous advancement of the posterior bladder-base, thus obliterating the posterior urethro-vesical angle.

Pressure Changes in Proximal one-third of Urethra

Under normal conditions, increased intraabdominal pressure raises the pressure in the proximal urethra, which is an abdominal organ. Thus, the escape of urine in the proximal urethra is prevented at the time of coughing, sneezing, etc. In a case of stress incontinence, on the other hand, according to Hodgkinson (1953), Jeffcoate and Roberts (1952), due to obliteration of posterior urethro-vesical angle, the bladder-neck gets displaced to the most dependent part of the

bladder. Thus, the internal urinary meatus is at the point of maximum hydrostatic pressure. Due to this anatomic funnelling, the equal transmission of sudden elevation of intraabdominal pressure to the lumen of proximal urethra does not occur. Thus, the intravesical pressure in the region of bladder-base rises more than intraurethral pressure and stress incontinence results.

Axial Rotation of Urethra

Bailey of Manchester (1954, 1956) found that an additional intraabdominal elevation of urethrovesical junction besides bladder plication resulted in higher incidence of cure of stress incontinence. From his findings, two basic types of anatomy have been described in cases of stress incontinence.

Type I: There is complete loss of posterior urethrovesical angle, but the angle of inclination of urethral axis to the vertical is normal (10°-30°) or less than 45°.

Type II: in which there is loss of posterior urethrovesical angle and definitely an abnormal angle of inclination of the urethral axis to the vertical.

However, Guerrero (1971) describes Type III as well. In this abnormality, only the inclination of the urethral axis deviates from normal and the posterior urethrovesical angle is normal.

The patients with downward and backward rotational descent of the urethral axis invariably experience the most severe degree of stress incontinence. They are most difficult to treat effectively and in the past have had the highest failure rate after various operative procedures. The signficance of the abnormal urethral axis is (i) for the better understanding of pathological anatomy of stress incontinence and (ii) for selection of proper operative procedure.

Diagnosis

The diagnosis of stress incontinence depends on—

(1) History

(2) Clinical examination, by which other abnormalities like vesico-veginal fistula and urge incontinence are excluded. This also includes the following tests:

(i) *Stress test*: The patient is made to cough in standing position with her feet apart. The passage of small quantities of urine through urethra on coughing, etc. indicates stress incontinence.

(ii) *Bonney's* urethro-vesical neck-elevation test:

By placing two fingers on either side of it, the bladder-neck region is elevated. Care is taken during this test so as not to compress or obliterate the urethra. The patient is then made to cough. Absence of escape of urine suggests that the patient is suffering from stress incontinence

(iii) *Read's Test*: In this test, a clamp, the tip of which is covered with rubber-tube is used for bladder-neck-elevation.

(iv) *Marchetti test*: It is a test, similar to the above two tests. In this test, the bladder-neck is elevated by grasping vaginal mucosa on either side of it with Allis forceps under local anaesthesia.

(iv) *Youssef's test*: This test is carried out in patients with uterine prolapse or cystocele, who complain of stress incontinence. On doing the usual stress test, these patients may appear continent. If the prolapse is reduced by applying a vulcellum to the cervix, the stress incontinence appears suggesting that the continence seen earlier was on account of kinking of the urethra.

(3) Urine examination and urine culture should be done to detect urinary

infection, which might be responsible for urge incontinence. This may simulate stress incontinence.

(4) Intravenous pyelography should be carried out to exclude an ectopic ureter.

(5) *Urethroscopy*: This, according to Low, in a case of stress incontinence may show increase in the diameter of the urethral lumen. Stoeckle (1952) observed the same.

(6) *Cystourethrography*: (a) Anteroposterior radiography by Millin-Read technique gives an idea about the abnormal descent and funnelling of bladder-neck region. This indicates inadequate support of the trigonal area. The advantage of this method is its simplicity.

(b) *Lateral radiography by the Mikulicz-Radecki-Roberts technique*: This technique, although technically difficult, demonstrates the dislocation of urethra as well. Two hundred ml. of 10% sodium iodide are filled into the bladder by a soft rubber catheter. Following this, 10 ml. of Neohydriol is instilled through the catheter which is spigoted. Lateral exposures are then made at rest and on straining.

Sphincterometrography by Youssef-Mahfouz technique

Miller-Abbott tube is inserted into the bladder until the balloon is well inside the bladder. The balloon is distended with 40 ml. of 25% sodium iodide solution. The tube is gently pulled down until the balloon rests on bladder base. The bladder is then filled up with 150 ml. of 5% sodium iodide. This tube is then connected to a water manometer.

The radiographs are taken (i) when the patient is at rest and the intravesical pressure is 10 cms. of water, (ii) the patient straining with intravesical pressure is 30 cm. of water and (iii) on maximum straining with intravesical pressure 60-80 cm. of water.

Descent of the baloon below the bladder-base is suggestive of internal sphincter weakness. If this occurs without funnelling or abnormal descent of the bladder-base, it indicates sphincter incontinence with normal support. The intravesical pressure at which the balloon passes into the urethra gives an idea about the severity of incontinence.

(7) *Bead-chain Cystourethrography*: The importance of this lies in the fact that it gives a documented evidence of stress incontinence and at the same time, indicates the type of stress incontinence, the knowledge of which helps in selection of suitable operative procedure.

However, there are certain drawbacks of bead-chain cystourethrography as mentioned by Green (1968). Presence of a foreign body like chain in the trigonal region might stimulate involuntary voiding activity, which by itself may show obliterated posterior urethro-vesical angle. Careful examination of this X-ray may show crenated appearance of the bladder, suggesting detrussor contraction. At the same time, the patient may feel obvious escape of urine.

At times, in a patient with stress incontinence the posterior urethro-vesical angle is completely obliterated only on straining. If such a patient fails to strain when the film is being actually taken, the exact extent of altered urethro-vesical anatomy may not be detected.

Two intermediate abnormal forms may be seen on cystourethrography:

(i) Short posterior urethro-vesical angle.

(ii) Partially obliterated urethro-vesical angle.

Not all of these patients show stress