Problems of Childhood

Disorders of micturition, abnormalities of urine, and urinary tract infection

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The 7-year-old who starts wetting the bed may have a urine infection. The 3-year-old girl with a sore perineum may have a urine infection. The boy of 4 whose mother complains that his urine has recently become strong, smelly, and cloudy may have a urine infection. But in practice probably none *will* have a urine infection. Even though urine infection is common, troublesome symptoms and signs affecting the urinary tract are even more common and are more likely to be associated with variations in behaviour, development, or other problems than with urinary tract infection. This article will deal with some of these disturbances of micturition and urinary abnormalities as well as urinary tract infection itself.

Disturbances of micturition

To be able to assess the disturbance one needs to remember the usual stages in developing bladder control, as well as the considerable variation between different children.

At about the age of 1½ the child passes urine at regular intervals and can be dry for at least one hour. At 2 he usually exclaims when voiding and by 2½ shows a need to void *before* voiding. After this he holds urine even though aware of the need to micturate, and if he can walk to the lavatory and remove his pants he may be able to control the situation most of the time. Therefore, by the age of 2½ most children, with the help of a sympathetic adult, can be dry by day.

At 3 most children go to the lavatory themselves, proudly broadcasting the fact to everyone. Sometimes they hold on too long, especially if preoccupied with play. They void from 8 to 14 times in 24 hours. Control of micturition at night usually emerges between the ages of 2½ and 3½. At the age of 3½, 75% of children have stopped wetting the bed.

By 4 the child is a connoisseur of water closets and reports back with great interest on the various features of different lavatories. It is a passionate affair, but brief, and lasts less than a year. At 5 the child voids 7 or 8 times per 24 hours and may refuse to void unless in private. By this age he is usually able to initiate emptying of the bladder at any degree of fullness, a skill limited to dogs and man (though man is not quite so adept at it).

FREQUENCY AND URGENCY

Frequency and urgency are often but not inevitably associated. They are both normal in the toddler. The toddler perceives bladder fullness suddenly and at the last moment. This state persists beyond

the toddler stage in many normal children; in order to keep dry they have to micturate as soon as they get the urge: they can't hold on. In older children it is called urgency syndrome and is somewhat analogous to the "irritable bladder" or urethral syndrome of adults.¹

Urgency syndrome is commoner in girls than boys and usually occurs in girls who have in fact had a normal pattern of micturition at an earlier age. It is often associated with a tendency to dampen the pants—urge incontinence. There is a familial predisposition.² Conditions such as urinary tract infection may precipitate the syndrome, but most children with urgency syndrome have neither infection nor any identifiable organic lesion causing bladder irritability. The urge to micturate comes on suddenly, and many of the children then suppress micturition by a combination of pelvic floor muscle contraction and external compression of the perineum. They may adopt a variety of characteristic postures: crouching with the heel of one foot pressed into the perineum, forced adduction of the thighs, or sitting on the extreme corner of a hard seat. The syndrome usually subsides by the age of 10.³ Various treatments have been used without conclusive proof of their benefit. When there is an associated urinary tract infection treatment of that infection may produce cure. For the rest—that is, the majority who have no infection—sympathetic explanation and a common-sense approach for both child and parent are needed. For them it is a troublesome (and smelly) condition; too much reproach or punishment will only aggravate the situation. The frequency of voiding becomes less during the early years of childhood. But again there is much individual variation, and though most 5-year-olds are voiding fewer than 10 times a day, many normal children are voiding much more.

Extreme frequency (pollakiuria)—The sudden onset of extreme frequency of micturition in a child should prompt a search for a urinary tract infection or some organic condition that might irritate the urinary tract. A few children are found to have no organic cause. The child is healthy, but suddenly starts voiding 30 or more times a day. She will use the pot in the doctor's surgery several times during the visit and will be in and out of bed throughout the night, often falling asleep on the pot or lavatory. The episodes are usually triggered off by an identifiable stress situation. The symptom may persist several weeks. Treatment is aimed at either relieving the stress or helping the child cope with the situation.⁴ If the doctor seen first can identify neither urinary infection nor obvious stress the child should be referred to a paediatrician, who would probably arrange for radiological investigation of the urinary tract to exclude organic abnormalities such as calculi.

PERINEAL SORENESS AND DYSURIA

A sore perineum may be secondary to persistent wetting or to local infection. Vulvovaginitis, the "sticky perineum syndrome" of young girls, is extremely common. The causes include poor hygiene and epidemic infections at school. This is commoner than the inflamed penis of balanoposthitis. But in both sexes local inflammation may cause painful micturition and is a commoner cause than true infection within the urinary tract. Therefore, inspection of the perineum is vital in any child with dysuria. In many children simple bathing (with or without the addition of disinfectant) and careful drying will cure. It is important to check that the girl is wiping her bottom correctly: some cause soreness by wiping themselves from back to front after opening their bowels.

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WETTING

Most children who wet have no demonstrable abnormality of the urine or urinary tract. Nevertheless, there is a strong association between infection and enuresis. Enuresis is the presenting symptom in 15% of children with urine infection.⁵ It is also common in school-children with asymptomatic bacteriuria.⁶ Conversely, children with enuresis have a higher incidence of urine infection than those without enuresis. A girl aged over 5 who wets the bed has a 5% chance of having a urine infection.⁷ It is uncertain whether the infection causes the enuresis, for it can be suggested that the wet perineum of the enuretic child might predispose to ascending infection. When enuresis is associated with urine infection, successful treatment of that infection cures the enuresis in about one-third of the children.⁵

Therefore, the child who is wetting at an age when dryness is expected should have the urine checked for infection—that is, bacteriological culture of urine. From the point of view of excluding other organic causes of enuresis a careful history is vital and there are several general guidelines that can be followed.

Daytime enuresis is uncommon after the age of 4 and especially uncommon in children who no longer wet the bed. But it is very common for mothers to complain about it. A careful history often reveals that the child really has urge incontinence. Dampening of the pants is common; puddles on the floor are not common. When puddles are occurring, the frequency of the mishap is important. After all, most self-respecting young children will have a few occasions during their 4th or 5th year of life when they are simply too busy with some enthralling activity or play to respond to the call of nature. And they learn the hard way that the important things of life cannot always be given priority. When the mother complains of the child's persistent dampness this must be verified with care. A recurrent tendency to dampness in a 4-year-old is common and often associated with urgency, but never being dry for even 30 minutes is a different matter. It might mean an ectopic ureter and a persistent dribbling leak. Such a leak is sometimes very small and presents as little more than apparent vaginal discharge.

About 10% of children with *nocturnal enuresis* have associated diurnal enuresis. A clear story about the wetting must be obtained, particularly about the longest period of dryness. Careful questioning invariably reveals that the child who is "always wet" is in fact occasionally dry for a night. This means that there can be no leak in the plumbing and that dryness is possible. Neurological causes of enuresis are improbable and would cause disturbance of bowel function or other neurological symptoms.

The management of enuresis is a rewarding art. There are few such troublesome conditions that can so easily be helped, and many useful reviews of different regimens of management are available.⁸⁻⁹ Whenever the main complaint is of a disturbance of micturition specific questions need to be asked about micturition itself—for instance, does the child pass a normal stream of urine?—and the general health of the child. In all cases the urine must be examined.

Abnormalities of the urine

Sometimes the abnormality is the reason why the mother consults the doctor, at other times the abnormality is first noticed by the doctor during investigation. The urine will need to be checked by Dipstix chemical testing and by microscopy or culture.

Cloudy urine—The usual cause is precipitated chemicals, such as phosphates or urates. They can be seen on microscopy and may dissolve on warming the urine or adding acetic acid. It is usually in winter that parents complain of their child's urine being cloudy, particularly if it has been standing in a pot in the bedroom overnight. If the cloudiness is from chemicals they can be reassured. Freshly passed urine should be clear. Infected urine usually causes a characteristic sheen when it is held up to the light, rather than extreme cloudiness.

Discoloured urine—Many dyes, drugs, sweets, and other confectionery may cause urine of unusual colour. "Strongly coloured" urine is usually found to be merely concentrated urine from a child who has not had much fluid. Blood may cause urine to be obviously red or more commonly a hazy brown colour. Dipstix tests or microscopy will verify the presence of blood. Any degree of haematuria is always abnormal; if there is no obvious cause such as urine infection, the child should be referred to a paediatrician.

Smelly urine—When the parent complains of the smell of the child's urine it is usually found that they are reporting the smell of stale urine in soiled clothes or in a wet bed. Sometimes, however, their complaint

points the way to detecting a urine infection. Infected urines may have an offensive, sometimes fishy smell, which is present in a freshly passed specimen.

Glycosuria—Because Dipstix tests are so convenient and widely used unexpected glycosuria may sometimes be encountered. When present it must be investigated rapidly to exclude diabetes mellitus; a Dextrostix test on a drop of blood is adequate for emergency screening. If blood glucose levels are raised the child should be admitted to hospital at once; if levels are normal referral can be to an outpatient clinic.

Albuminuria—A trace reading on Albustix is found in the urine of 20% of normal children; therefore a trace reading is normal. Five per cent of urine samples from healthy schoolchildren yield a reading of 0.3 g/l or more. In some it is a sign of significant urinary tract disorder. Many normal children have transient albuminuria during a fever or after severe exertion; but children with sustained albuminuria of 0.3 g/l or more should be referred for further investigation. Renal disease is a likely cause. Albuminuria is a most unreliable sign of urinary tract infection and is a useless test for it.

Urinary tract infection

This article has emphasised that while many different urinary tract symptoms and signs may be associated with urinary tract infection, there is none that is always associated. Moreover, all these symptoms and signs are commoner in children whose urine is not infected, which is one reason for a great amount of needless anxiety and overtreatment of uninfected children today.

Yet urinary tract infection is common; from birth to adolescence the prevalence is just over 1%. By the age of 10 about 8% of girls will have had a urinary tract infection. The symptoms are variable: they may be negligible. There may be disorders of micturition—frequency, urgency, wetting, or dysuria—or there may be none. There may be fever, tummy ache, and, on rare occasions, loin pain, but equally well the child may have none of these. This means that the doctor's degree of alertness for detecting urinary tract infection must be high and his willingness to take trouble to identify it must be even higher.

Urinary tract infection does cause some babies to fail to thrive, some children to have recurrent fevers, and a few to acquire damaged kidneys. Therefore it is worth the trouble involved in diagnosis and treatment. Diagnosis can be made only by identifying bacteria in a fresh, carefully collected specimen of urine. Though it may be a time-consuming nuisance to collect urine from infants and young children, it need not be if a flexible approach with various methods is used. There is no need to wash down the child's perineum unless it is grossly dirty with faeces. Infants often void while being undressed, as their tummy is exposed to the cold; the interested doctor has a sterile container at hand to collect the mid-air specimen. Plastic urine-collecting bags which fit over the perineum yield clean specimens provided they are emptied as soon as the urine is passed, and provided nappies and pants are removed so that the contents of the bag are not pressed against the perineum. For toddlers the Orion urine-collecting pot is useful (see figure)—the midstream portion of urine spurts forward into the clean collecting cup. The dribbles at the beginning and end, which may be messy, pass into the main pot and are discarded.

A doctor skilled at urine microscopy will expect to detect over 90% of infected urine by immediate microscopy, but certain diagnosis depends on bacteriological culture. Urine is infected if there is a growth of more than 100 000 organisms per ml. Counts below 10 000 are considered normal; counts in-between need repeating. There may be an excess of leucocytes (pus cells), but this is not required to diagnose urine infection. The usual organism is *Escherichia coli*.

Pot for collecting mid-stream urine specimens from girl toddlers. A—Main receptacle. B—Cup for collecting midstream portion of urine.

A mixed growth raises the possibility of a false result from contamination.

There are many good and extensive reviews of the management and consequences of urinary tract infection.¹⁰ Despite the controversy that exists over some aspects, a consensus emerges. Initial treatment consists in plenty of fluid, encouraging frequent micturition, and a 7-10 day course of one of the many cheap, safe, and effective chemotherapeutic agents available which are likely to be effective against *E coli* (sulphadimidine, nitrofurantoin, etc). Subsequent follow-up is essential, for about a third of the patients will have a recurrence within the next year. It is as unreasonable to claim to have cured a urine infection on the basis of a sterile urine two weeks after treatment as it would be to claim to have cured asthma because there is no wheezing after a course of steroids and bronchodilator drugs. In many children the tendency to develop urine infection persists. This is why children who have had a urine infection should be referred for further investigation. Provided there is good evidence of infection, in most cases an intravenous urogram and micturating cystogram will be arranged to seek obstructive lesions or vesicoureteric reflux.

Conclusion

The investigation of urinary tract disorders requires patience and care at all levels. Nevertheless, it is rewarding at all levels. The general practitioner, the school doctor, and the hospital doctor will find many simple causes and cures for distressing

disorders of micturition, many opportunities for reassuring worried parents, as well as opportunities for treating confirmed cases of urine infection. In this way they may justifiably claim to be preventing subsequent scarred kidneys, deviant behaviour, or disordered development—which is what the medical care of children is all about.

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General Practice Observed

Communications to an antenatal clinic

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Summary

When referring pregnant women to an antenatal clinic many general practitioners and midwives presented details of their care in an incomplete and inconsistent manner. As a result, hospital staff often had insufficient basic data from which to work. We recommend that those providing care decide what information they need and make the rationale of collecting this information the subject of a well-evaluated local education programme.

Introduction

For several years the use of hospital care and delivery for pregnant women has been increasing, resulting in 91.9% of all confinements taking place in National Health Service hospitals in 1973.¹ This trend has been accompanied by an increase in the referral rate to antenatal clinics for assessment and booking and the advent of shared antenatal and postnatal care between

hospital staff and community services. As methods of care have changed, the number of professionals providing care has increased, while the need to record and share clinical information has become of even greater importance.

The need for a study of the information provided by general practitioners when making referrals to an antenatal clinic became apparent during discussions in the department of community health about the nature of shared antenatal care: opinions differed between consultants and general practitioners about the information presented by the latter when referring a woman for hospital care. It was therefore decided to monitor all data provided with each general practitioner referral allotted to the professorial unit clinic. Data from all information sources, either sent ahead of the patient or with her on the day of appointment, would be used to complete a structured questionnaire.

Method

Study population—New requests for booking at the antenatal clinic were systematically allocated to the three obstetric firms. Each week about 90 new referrals were allocated as they arrived into three groups, the professorial unit receiving about 30 new cases. Altogether 108 consecutive patients' referral documents were reviewed. Eight sets were excluded from the study when the patient failed to attend on the day, giving a sample population of 100. Information from the sample was collected over eight days during four weeks in November and December 1974.

Organisation of fieldwork and data collection—The objectives of the study were explained to the hospital medical, nursing, and secretarial

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