Conservative treatment and anti-reflux surgery in adults with vesico-ureteral reflux: effect on urinary-tract infections, renal function and loin pain in a long-term follow-up study

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Abstract

Study purpose. To investigate the long-term effects in adults of conservative treatment and anti-reflux surgery for vesico-ureteral reflux on urinary-tract infections, renal function, and loin pain.

Methods. Of 115 adult patients with vesico-ureteral reflux diagnosed between 1968 and 1984, conservative treatment was given to 46 patients (36 women) and anti-reflux surgery was performed in 57 patients (52 women). The remaining 12 patients underwent nephrectomy or heminephrectomy and were excluded from the study. The anti-reflux surgical methods used were the Politano–Leadbetter procedure in 44 patients (73 ureters) and the Hutch procedure in 19 patients (25 ureters). Six of these patients were operated on with both methods.

Results. The frequency of acute pyelonephritis was significantly reduced after anti-reflux surgery (P < 0.0001) as well as after diagnosis of vesico-ureteral reflux in the group given conservative treatment (P < 0.001). The frequency of lower-urinary-tract infections was not altered in either group. Surgery had no effect on significant albuminuria (Albustix ≥ 2+) or on progressive renal functional deterioration. Forty-three patients reported recurrent loin pain at the time of diagnosis or anti-reflux surgery. Only one of the 12 patients in the conservative group, compared with 29 of the 31 patients in the anti-reflux surgery group, obtained relief from loin pain during the follow-up. Nine patients in the anti-reflux surgery group reported restitution of reduced general well-being after surgery. These patients had experienced weariness and/or headache before surgery. Vesico-ureteral reflux was eliminated more frequently (P < 0.01) in the patients operated on by the Politano–Leadbetter procedure (94%) than in those operated on by the Hutch procedure (68%).

Conclusions. Loin pain is common in adults with vesico-ureteral reflux and is effectively eliminated by anti-reflux surgery. Anti-reflux surgery should be considered in adults with vesico-ureteral reflux and very frequent acute pyelonephritic attacks only if conservative treatment has failed to alleviate these symptoms. Anti-reflux surgery is not indicated with the aim of arresting renal functional deterioration.

Keywords: anti-reflux surgery; loin pain; renal function; uretero-vesical obstruction; urinary-tract infection; vesico-ureteral reflux

Introduction

Primary vesico-ureteral reflux (reflux) is a well-known disorder in children. Reflux in adults is probably more frequent than is generally acknowledged [1]. Spontaneous remission of reflux cannot be expected to occur in adults as often as in children due to the fact that the intramural segment of the vesico-ureteral junction no longer elongates by growing [2,3]. Loin pain is probably the only symptom originating from the urinary tract that can be specifically attributed to reflux. It is also one of the major indications for anti-reflux surgery (surgery) in older children and adults [4]. The presence of reflux and the patient’s susceptibility to symptomatic urinary-tract infections (UTI) [5] increase the risk of recurrent UTI. Surgical correction of reflux has been suggested to reduce the incidence of acute pyelonephritis (APN) in adults [6,7] and children [8–10] and to reduce UTI (no clear distinction is made between APN and lower UTI) in adults [2,11–20]. However, few studies on adults have compared the clinical course of patients after surgical correction with that of patients treated by conservative means only. Furthermore, previous studies have relatively short follow-up times and most have included only small numbers of patients in the conservative group [1,2,7,11,14,17–19,21]. There has been much debate on the treatment of reflux in adults [2,6,7,13,14,16–22], but there is at present no consensus on the indications.
for treatment. Thus, indications for surgery in adults are still the subject of controversy.

The aim of this study was to compare the long-term effects of conservative treatment and anti-reflux surgery on UTI, renal function and loin pain in adult patients with reflux. The patients were followed for a median of 16 years after diagnosis of, or surgery for, reflux (diagnosis/surgery).

**Subjects and methods**

**Subjects and criteria**

Between 1967 and 1984, reflux was diagnosed in 125 patients admitted to the Departments of Nephrology or Urology at the University Hospital in Lund, Sweden.

The following criteria were used for inclusion in the study: primary reflux demonstrated at micturating urography (MUCG) performed at the age of 16 years or later; urography of adequate quality performed in association with MUCG; no evidence of urinary-tract obstruction and no anti-reflux surgery performed before entry to the study. Ten patients did not fulfil the criteria and were excluded. The mode of presentation leading to the diagnosis of reflux in the remaining 115 patients has been reported previously [23].

Another 12 patients were subjected to nephrectomy or heminephrectomy and were also excluded. Thus 103 patients (88 women) participated in the present study.

The choice of treatment (conservative or surgical) was based on consensus agreement between nephrologists and urologists in 70 patients, by nephrologists alone in 17 patients, and by urologists alone in 16 patients. Indications for surgery were found in 61 patients, but four of these opted for conservative treatment. Thus 57 patients underwent anti-reflux surgery, and 46 patients were treated conservatively.

The median age at diagnosis/surgery was 28 years (range 16–60). The patients were followed for a median of 16 years (range 1–25). Five patients had a follow-up shorter than 6 years, in four cases due to the development of end-stage renal disease (ESRD) and in one case due to accidental death.

Clinical features of the patients in the two treatment groups are shown in Table 1.

<table>
<thead>
<tr>
<th>Table 1. Clinical and radiological features in 103 patients with vesico-ureteral reflux</th>
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<tr>
<td>Conservative treatment group</td>
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<tr>
<td>n Patients (women)</td>
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<tr>
<td>Age at diagnosis/surgery, median years (range)</td>
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<tr>
<td>Women</td>
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<td>Men</td>
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<td>Follow-up, median years (range)</td>
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<td>Women</td>
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<td>Men</td>
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<tr>
<td>Grade I reflux, n ureters</td>
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<td>Grade II reflux, n ureters</td>
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<tr>
<td>Grade III reflux, n ureters</td>
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<td>Renal damage, n patients (%)</td>
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* Number of anti-reflux operated ureters shown in parentheses.

**Radiology**

Radiological features are shown in Table 1. All patients were examined at least once by urography. All urographies were judged blindly by two experienced radiologists without information about clinical history. Renal damage was defined according to Hodson [24] as localized contraction or reduced thickness of the renal parenchyma associated with clubbing of the adjacent calyx. In addition, an isolated parenchymal reduction (or retraction) or an isolated club-shaped calyx was accepted as renal damage. A small kidney with uniform parenchymal reduction and normal calyces was also classified as damaged.

All patients were examined at least once by MUCG. The highest reflux grade obtained was chosen for grading of reflux if more than one examination had been performed. A three-grade scale was used to classify the degree of reflux: grade I, reflux into the ureter; grade II, reflux into the renal pelvis without dilatation of the pelvis and calyces; and grade III, reflux into the renal pelvis with dilatation of the pelvis and calyces.

In the conservative group, at least one follow-up MUCG was performed in 24 patients; two follow-up MUCGs were performed in 11 patients. The latest follow-up MUCG was performed after a median of 4.2 years (range 0.5–19.8).

In the surgery group, at least one follow-up MUCG was performed in all 57 patients, and at least two follow-up MUCGs (range 2–6) were performed in 35 patients. The first follow-up MUCG was performed within 1 year in 53 patients and within 2 years in 56 patients. The latest follow-up MUCG was performed after a median of 1.8 years (range 0.1–21.9).

**Assessment of clinical data**

The history of UTI, chemoprophylaxis, loin pain, and general well-being was based on information from medical records and personal interviews. Medical records from the Departments of Nephrology and/or Urology in Lund were available for all patients. Records from referring hospitals and primary care centres were also studied. Thirty-nine patients had been under hospital care occasionally before 16 years of age. Medical records were available for 29 of these patients. Apart from the information obtained at regular clinical visits during the follow-up, standardized personal and/or telephone interviews were conducted at least once by the same nephrologist (JK) in 83 patients. Twelve patients in the conservative group and eight patients in the surgical group were not interviewed (seven had died and 13 were not contactable).

The cumulative duration of chemoprophylaxis, the proportion of patients with APN and/or lower UTI, renal function, albuminuria, and loin pain were analysed over the entire study period. In addition, an observation period of 9 years before and 9 years after diagnosis/surgery was analysed separately with regard to UTI and cumulative duration of chemoprophylaxis. As 11 patients had a follow-up period of less than 9 years, this analysis comprised 92 patients. The aforementioned clinical parameters were also analysed for observation periods of 5 years (100 patients) and 2 years (103 patients).

**Type and frequency of UTI**

Lower UTI was considered to occur when the patient had a history of urinary-tract symptoms with urgency and/or pain at micturition and a body temperature of less than 38 °C.
APN was considered to occur when the patient had bacteriuria ($\geq 10^3$ bacteria/ml) and fever of 38°C or more. Findings of loin pain and/or serum C-reactive protein concentrations of more than 30 mg/l gave additional support to the diagnosis. Nineteen patients had a history of frequent episodes of ‘chills’, high fever and loin pain, which lasted for 1–3 days. As these patients were often familiar with the short natural course of these symptoms, they did not ask for medical advice every time they occurred. Such episodes were also classified as APN. In addition to episodes of UTI documented in the patients’ medical records, an arbitrary estimation of the frequency of additional APN (10 patients) and lower UTI (11 patients) was used when information by personal interview could not be obtained or sufficient data was lacking in the medical records. Thus, when hospital notes contained information of ’sporadic’, ‘recurrent’ or ‘frequent’ infections per year, these statements were arbitrarily interpreted as one, two or three annual infections respectively.

**Renal function**

Impaired renal function was defined as a serum creatinine concentration (Scr) $\geq 115$ μmol/l. We considered that renal function was deteriorating when the Scr was $\geq 115$ μmol/l at follow-up and had increased by $>20\%$ from the time of diagnosis/surgery to the end of follow-up.

**Albuminuria**

Albuminuria was assessed by urine dipstick (Albustix®), the method routinely used at the time of the start of the study. The grading of albuminuria was as follows: 0, no albuminuria, 1+ $\approx 100$ mg/l, 2+ $\approx 300$ mg/l, and 3+ $\geq 1000$ mg/l. There is considerable overlap between the last three groups. Significant albuminuria (albuminuria) was regarded as present when Albustix® was 2+.

**Assessment of loin pain**

Loin pain (flank pain or back pain not referable to the spine or to acute pyelonephritis) was evaluated according to its severity and duration. Any association of loin pain to bladder distension and/or the act of micturition was noted. The severity of pain was classified as severe or not severe. The duration of loin pain was defined as the time from the first recognized episode of loin pain to the time of diagnosis/surgery.

**Surgery**

The main indication for surgery was APN, followed by kidney protection, recurrent lower UTI and loin pain (Table 2).

Surgery was performed by staff urologists at the Department of Urology, University Hospital, Lund, except in one patient who was operated on elsewhere. Ureteral reimplantation was performed according to the Politano–Leadbetter (PL) procedure on 73 ureters (44 patients) and the Hutch procedure on 25 ureters (19 patients). Six of the patients were operated on by both methods.

**Statistical analysis**

The chi-squared test was used to compare the technical outcome of the PL and the Hutch procedures. Non-parametric Wilcoxon signed rank test was used to compare the number of UTI and the duration of chemoprophylaxis before and after diagnosis/surgery in all patients. Statistical analyses were performed on women and men combined. Separate statistical analyses of women showed similar results as for women and men combined. A $P$-value of $<0.05$ was considered statistically significant.

**Results**

**Radiological findings at diagnosis/surgery**

Reflux status at diagnosis/surgery is shown in Table 1. Renal damage was common in both groups (Table 1).

**Technical outcome of the PL and Hutch procedures**

Reflux was eliminated in 66 of 70 ureters in 44 patients operated on by the PL procedure and in 17 of 25 ureters in 19 patients operated on by the Hutch procedure. Thus, the success rate was significantly higher ($P<0.01$) in the former group (94%) than in the latter group (68%). Three patients with unilateral reflux at MUCG were operated on bilaterally by the PL procedure because of contralateral refluxing orifices seen at surgery. Post-operative uretero-vesical obstruction developed in two ureters in two patients operated on by the PL procedure. The operations were repeated in these patients and the obstructions removed.

**Effects of conservative and surgical treatment on UTI**

Data on UTI and chemoprophylaxis before and after diagnosis/surgery over the entire study period are shown in Table 3.

**Acute pyelonephritis**

Over the entire study period, a higher proportion of patients in the surgery group than in the conservative group had at least one APN before diagnosis/surgery. The proportion of patients with at least one APN decreased after diagnosis/surgery in both groups (Table 3).

Frequency of APN during the 9-year observation periods. In the conservative group, 17 patients (45%) had at least one APN (median two APN; range 1–37) before diagnosis. After diagnosis the number of patients with APN decreased to eight (21%) (median one APN; range 1–10). In the surgery group, 39

<table>
<thead>
<tr>
<th>Indications for anti-reflux surgery in 57 patients</th>
<th>$n$ Patients</th>
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<tbody>
<tr>
<td>Recurrent acute pyelonephritis</td>
<td>32 (9*)</td>
</tr>
<tr>
<td>Recurrent lower UTI</td>
<td>17 (7)</td>
</tr>
<tr>
<td>Loin pain</td>
<td>17 (1)</td>
</tr>
<tr>
<td>Kidney protection</td>
<td>21 (12)</td>
</tr>
</tbody>
</table>

* Number of patients with a single indication are given in parentheses.
patients (72%) had at least one APN (median four APN; range 1–52) prior to surgery, which decreased to 18 patients (33%) (median two APN; range 1–6) after surgery. Absence of APN before as well as after diagnosis/surgery was noted in 35% of the patients. Individual changes in the number of APN are shown in Table 4. The decrease in the frequency of APN during the follow-up period was statistically significant in both the conservative group ($P<0.001$) and the surgery group ($P<0.0001$) (Table 4). Similar results were obtained when the 5- and 2-year observation periods were analysed.

In order to study the influence of reflux status (persistent reflux or not) on the frequency of APN during the follow-up, a separate analysis was made taking the results of follow-up MUCG (both conservative and surgery groups) into consideration. The results of this analysis are as follows.

**Conservative group.** In the 9-year observation periods, persistent reflux was revealed in 18 patients, while five patients had no demonstrable reflux at the follow-up MUCG. Assuming that the patients without follow-up MUCG (15 patients) had persistent reflux, 33 patients with demonstrated or assumed persistent reflux were identified. A decrease in the frequency of APN was found in 12 of these 33 patients (median three APN; range 1–37) ($P<0.004$). Similar reduction of APN was obtained when analysing the 5-year ($P<0.005$) and 2-year ($P<0.003$) observation periods. Including only those patients with documented persistent reflux at the follow-up MUCG, a reduced frequency of APN was observed for the 9-, 5- and 2-year ($P<0.04$) observation periods.

**Surgery group.** Among the 54 patients in the 9-year observation periods (Table 4), 44 had no reflux and 10 had persistent reflux (eight after unsuccessful surgery and two after successful ipsilateral surgery, but persistent non-operated contralateral reflux) at the follow-up MUCG. A decrease in the frequency of APN was observed in 27 of these 44 patients (median four APN; range 1–45) ($P<0.0001$). Similar results were obtained when analysing the 5-year ($P<0.005$) and the 2-year ($P<0.003$) observation periods. A reduction in APN frequency was also seen in the patients with persistent reflux after surgery for all of the three studied observation periods (9, 5 and 2 years) ($P<0.03$).

**Lower UTI**

Over the entire study period, the proportion of patients with at least one lower UTI before diagnosis/surgery was somewhat higher in the surgery group than in the conservative group. After diagnosis/surgery the figures were comparable (Table 3).

Frequency of lower UTI during the 9-year observation periods. In the conservative group, 17 patients (45%) had at least one lower UTI (median two lower UTI; range 1–35) before diagnosis. After diagnosis/surgery the number of patients increased to 20 (53%) (median four lower UTI; range 1–11). In the surgery group, 27 patients (50%) had at least one lower UTI (median eight lower UTI; range 1–54) prior to surgery, compared with 30 patients (56%) (median four lower UTI; range 1–27) after surgery. Absence of lower UTI before as well as after diagnosis/surgery was noted in 30% of the patients. Individual changes in the number of lower UTI are shown in Table 5. There was no significant change in the frequency of lower UTI in

Table 4. Individual changes in the number of acute pyelonephritis during 9 years before and 9 years after diagnosis/surgery in 92 patients (11 additional patients had less than 9 years of follow-up)
any group. The results for the 5- and 2-year observation periods were similar and showed no significant change in lower UTI frequency.

An increased frequency of lower UTI was common in patients who had had a reduction in APN frequency, in both the conservative (6 of 15 patients) and the surgery (15 of 34 patients) groups. The median increase was three lower UTI (range 1–27) in these 21 patients. In the patients who had had no change or an increase in APN frequency, only three of 23 patients in the conservative and three of 20 patients in the surgery groups had an increase in lower UTI frequency. The median increase was five lower UTI (range 1–10) in these six patients.

**Chemoprophylaxis**

The cumulative duration of chemoprophylaxis over the entire study period is shown in Table 3. Over the 9-year observation periods, 37% of the patients had no chemoprophylaxis. There was no significant difference in the cumulative duration of chemoprophylaxis before, as compared with after diagnosis/surgery, in any of the groups. Similar findings were made for the 5- and 2-year observation periods, except for the 2-year observation periods in the surgery group, where the median cumulative duration of chemoprophylaxis decreased from 11 months to 1 month ($P<0.02$).

**Renal function and albuminuria at diagnosis/surgery and at follow-up**

There were more patients with impaired renal function and albuminuria (Table 6) in the conservative group than in the surgery group at diagnosis/surgery as well as at the end of follow-up.

Table 6 shows renal function at follow-up in relation to that at diagnosis/surgery. Deteriorating renal function was seen in 17 patients in the conservative group and in eight patients in the surgery group during follow-up. Taking account of renal function at diagnosis/surgery, the proportion of patients with deteriorating renal function was similar in the two treatment groups. Stable renal function was seen in 29 patients in the conservative group and in 49 patients in the surgery group during follow-up. Albuminuria was found at diagnosis/surgery in 23 patients, of whom 20 had deteriorating renal function. During follow-up, albuminuria occurred in two additional patients, both had deteriorating renal function. ESRD developed in 16 patients distributed between the two treatment groups as shown in Table 6.

**Loin pain before and after diagnosis/surgery**

A history of recurrent loin pain at any time before diagnosis/surgery was reported by 48 patients (41 women). Forty-three patients had recurrent loin pain

<table>
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<tr>
<th>Renal function</th>
<th>Conservative treatment</th>
<th>Anti-reflux surgery</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Diagnosis ($n$ patients)</td>
<td>Follow-up ($n$ patients)</td>
</tr>
<tr>
<td>Scr $&lt;115$ μmol/l</td>
<td>31</td>
<td>27</td>
</tr>
<tr>
<td>Scr 115–159 μmol/l</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Scr $\geq160$ μmol/l</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Albuminuria (Albustix® $\geq2+$)</td>
<td>16</td>
<td>16</td>
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</tbody>
</table>

End stage renal failure developed in $^*$1 patient, $^*$2 patients, $^*$9 patients, $^*$3 patients.
at the time of diagnosis/surgery (Table 7) (excluding five patients with only temporary previous loin pain). The median duration of loin pain was 4 years (range 1–54) in 37 patients and ‘several’ years in six patients. The pain was described as severe in 13 patients and as not severe in 30 patients. Loin pain was always associated with bladder distension and/or micturition in 22 patients, only sometimes in eight patients and never associated with these states in 13 patients.

The reflux status on the side of loin pain at surgery (47 ureters in 31 patients) was as follows: no reflux in two ureters (4%) in two patients, grade I reflux in eight ureters (17%) in eight patients, grade II reflux in 28 ureters (60%) in 24 patients and grade III reflux in nine ureters (19%) in seven patients. The corresponding data in the conservative group (15 ureters in 12 patients) at diagnosis was as follows: no reflux in one ureter (7%) in one patient, grade I reflux in three ureters (20%) in three patients, grade II reflux in 11 ureters (73%) in 11 patients. Thus the proportions of ureters without reflux and with reflux of grade I and II were similar in the two treatment groups. Grade III reflux was seen in the surgery group alone.

Loin pain disappeared after surgery in 29 patients, in two cases despite continued reflux at follow-up MUCG (lesser degree of reflux than before surgery). Two patients had continued loin pain after surgery, in both cases unchanged grade II reflux was demonstrated at follow-up MUCG. Only one patient with loin pain before diagnosis in the conservative group experienced disappearance of loin pain during follow-up, despite continued reflux. The remaining 11 patients had continued loin pain and all but one had persisting reflux (on at least one side) during follow-up.

**Subjective and objective assessments of the frequency of UTI after surgery**

The patients’ subjective estimation of the frequency of UTI supported the objective assessment, but was more conservative in that more patients reported an unchanged UTI frequency after surgery (Table 8).

**Effect of surgery on general well-being**

Nine patients in the surgery group reported restitution of reduced general well-being after surgery. All these patients had experienced weariness and/or headache before surgery.

**Discussion**

The patients in this study had a median follow-up time of 16 years, which is significantly longer than in other adult anti-reflux surgery series, which have ranged between 0.5 and 4.2 years [6,7,11,12,14,15,18,19,25]. Although patients were not randomized, the study is unique in that it allowed evaluation of conservative as well as surgical treatment of reflux in adults. From the lack of randomization, it may be argued that only those patients with more severe disease were selected for surgery. However, apart from slight differences in the frequency of APN, renal function, and age of women at inclusion, reflux status, renal damage, and follow-up time were comparable in the two groups. We have shown that the frequency of APN decreased significantly and that loin pain was eliminated in nearly all the patients after anti-reflux surgery. In the conservative group, a similar decrease in frequency of APN was seen, while loin pain remained in nearly all patients. Surgery had no effect on albuminuria or on progressive renal functional deterioration irrespective of renal function at the time of surgery.

The PL procedure had a technical success rate of 94%, which is comparable with the success rates in other series (between 83 and 100%) using the same procedure [6,7,11,13,15]. The Hutch procedure, which is rarely used today, had a significantly lower technical success rate than the PL procedure in our study. Post-operative uretero-vesical obstruction occurred only with the PL procedure in two ureters (3%). It is a rare complication after anti-reflux surgery and varies in the literature between 0% and 8% [6,7,11–16,18–20,25,26]. Taking into account the development of surgical techniques since the beginning of the present study,
anti-reflux surgery must be considered as a safe and technically efficient procedure in adults.

Absence of a history of APN before diagnosis/surgery was noted in 25% of the patients. This figure is probably an overestimate as a history of febrile episodes in childhood might have been forgotten or overlooked. In order to minimize such bias, we analysed the frequency of UTI also for 2-, 5- and 9-year observation periods before and after diagnosis/surgery. The frequency of APN was significantly reduced after surgery. However, a similar pattern was also seen in the conservative group. This was also evident when the outcome of the follow-up MUCG (persistent reflux or not) was taken into consideration. The patients’ subjective assessments supported the objective results (Table 5). The beneficial effect of surgery can therefore be questioned.

Whether chemoprophylaxis before and after diagnosis/surgery might have influenced the results is an intriguing issue. The cumulative duration of chemoprophylaxis before and after diagnosis/surgery was similar in the two groups and comprised a relatively small proportion of the entire study period. Within each group, there was no significant difference in the cumulative duration of chemoprophylaxis before and after diagnosis/surgery. Differences in chemoprophylaxis do not therefore appear to have influenced the results in general.

We believe that the decreased frequency of APN in the two treatment groups may be explained by a combination of measures, such as improved clinical surveillance of the patients, including medical counselling with regard to chemoprophylaxis, sexual behaviour, voiding habits, and liberal fluid intake. Elimination of reflux by surgery is most probably of additive value by making it more difficult for infection to reach the kidney. Other authors have found similar results of anti-reflux surgery in preventing recurrent APN in adults [6,7] or recurrent UTI (no clear distinction between APN and lower UTI was made) [2,11–20]. Previous studies on adults that have analysed conservative as well as surgical treatment [1,2,7,11,14,17–19,21] had relatively short follow-up times and generally small numbers of patients in the conservative group, thus making it difficult to compare the clinical course after surgical correction with that of patients treated by conservative means only. Convincing proof of any difference between the two modes of treatment with regard to the outcome of UTI is not to be found in the literature. In children, however, the number of pyelonephritic episodes during 10 years of follow-up was significantly less in the anti-reflux surgery group than in the medical group in the European part of The International Reflux Study in Children [9], one of few studies with randomization to surgical and conservative treatment.

Although recurrent lower UTI does not cause renal damage, it does cause considerable suffering. Thus the question of whether the elimination of reflux reduces the frequency of lower UTI is of clinical interest. This issue applies primarily to women, as men under the age of 60 do not generally have recurrent lower UTI. There was no significant difference in the number of lower UTI before and after diagnosis/surgery in either group (Table 5), although the patient’s subjective assessment indicated a slight improvement after surgery (Table 8). A reduced frequency of lower UTI after anti-reflux surgery has been reported by Erichsen and Genster [7]. Interestingly, 43% of all patients who had a reduction in APN during the 9 years of follow-up (Table 4) had an increase in the number of lower UTI in the same period. The corresponding figure in the patients who had an unchanged or increased number of APN was only 14%. This suggests that it may be the patient’s susceptibility to symptomatic infections, and not only the reflux itself, that puts the patient at risk [5]. A similar observation has been made by De Sy et al. [16]. In conclusion, no beneficial effect of surgery on lower UTI in general could be demonstrated in the present study.

Normal renal function at inclusion was rarely associated with deteriorating renal function during follow-up. Among the 82 patients with Scr <115 μmol/l at inclusion, renal function deteriorated in five, two of whom developed ESRD. On the other hand, impaired renal function at inclusion was nearly always associated with further deterioration of renal function during follow-up, regardless of conservative or surgical treatment. Among the 21 patients with Scr ≥115 μmol/l at inclusion, renal function deteriorated in 20, 14 of whom developed ESRD. Nearly all patients with Scr ≥160 μmol/l at inclusion developed ESRD. Thus we could find no evidence that surgery could prevent progressive deterioration of renal function. Other authors have also been unable to demonstrate any such effect of anti-reflux surgery in patients with
impaired renal function, especially in the presence of albuminuria [6,12,21,27,28]. In our study, all patients whose renal function deteriorated had albuminuria. Albuminuria, which correlates with the presence of focal and segmental glomerulosclerosis, has been shown to be the most important indicator of progressive deterioration of renal function in reflux nephropathy [29].

Loin pain occurred in 47% of the patients before diagnosis/surgery in this study. Loin pain is thus a common symptom of reflux in adults and has been found in 10–67% of patients with reflux in previous studies [6,14,17,18,25,26]. In our study loin pain was most commonly associated with grade II or III reflux, but was also seen with grade I or without demonstrable reflux in some cases. The reflux grade in those with loin pain was comparable in the two treatment groups, except that grade III reflux was seen only in the anti-reflux surgery group. The effect of anti-reflux surgery in eliminating loin pain was clearly associated with the disappearance of reflux while continued loin pain was associated with persisting reflux at follow-up MUCG. Loin pain occurred at micturition or bladder distension in most cases, which strongly suggests that reflux was the cause of pain. In the patients where no such relationship was found, no other cause of pain was revealed and a relationship with reflux seems likely, as reflux may occur unrelated to micturition or bladder distension. Twenty-nine of 31 patients were relieved of their loin pain after anti-reflux surgery, as compared with only one of 12 patients in the conservative group. The present study therefore clearly demonstrates the efficacy of surgery in eliminating loin pain. Previous publications have rarely commented on the effects of surgery on loin pain present pre-operatively [6,14,17,18,25,26]. Although not a common phenomenon, reflux may be an underestimated and a potentially curable cause of flank/back pain in adults.

Nine patients subjected to surgery in our study spontaneously reported marked improvement of general well-being after surgery. As reflux was eliminated in these patients, a causal relationship seems likely. In children with reflux and vague ill health, dramatic improvements in general condition have been described [30,31]. The causes of vague ill health are unclear. Factors such as malnutrition because of frequent illness and stress caused by constant use of chemoprophylaxis have been suggested. Physical growth has been shown to increase after anti-reflux surgery in children [8,31,32].

We conclude from the present long-term follow-up study, that loin pain appears to be a common symptom in adult patients with reflux, and that it is effectively eliminated by anti-reflux surgery. Surgery does not in general eliminate lower UTI, but appears to reduce the frequency of APN. As a similar reduction in APN was achieved by conservative treatment, the benefits of surgery are uncertain. Surgery for UTI should thus be reserved for cases with severe, long-standing symptoms of APN and only after failure of conservative treatment. Anti-reflux surgery is not indicated for arresting functional renal deterioration.

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References


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