Transverse vaginal septae: management and long-term outcomes

CE Williams, RS Nakhal, MA Hall-Craggs, D Wood, A Cutner, SH Pattison, SM Creighton

Objective To examine the management and long-term outcomes of transverse vaginal septae.

Design Observational study with cross-sectional and retrospective arms.

Setting Tertiary referral centre specialising in Mullerian anomalies.

Population Forty-six girls and women with a transverse vaginal septum.

Methods Data from medical records of all cases (1998–2013) of transverse vaginal septae were collected and reviewed. Patients over 16 years of age also completed a questionnaire.

Main outcome measures Presentation, examination findings, investigations, surgery, and long-term reproductive outcomes.

Results The septae in the study were described as follows: 61% (95% CI 0.46–0.74) were imperforate, and presented with obstructed menstruation; 39% (95% CI 0.26–0.54) were perforate, and presented with a variety of concerns; 72% (95% CI 0.57–0.83) were low, 22% (95% CI 0.12–0.36) were mid-vaginal, and 6% (95% CI 0.02–0.18) were high; 33% were managed via an abdominoperineal approach, 59% were managed via a vaginal approach, and 6% had laparoscopic resection (one patient did not have surgery); 11% (95% CI 0.05–0.23) of patients presented with reobstruction, all following abdominoperineal vaginoplasty; 7% presented with vaginal stenosis, two following vaginal resection and one following the abdominoperineal approach; 61% of questionnaires were returned. These results showed that 22/23 patients were menstruating and one had a hysterectomy, 74% had been sexually active, 35% had dyspareunia, and 36% complained of dysmenorrhoea. There were seven pregnancies, with one termination and six live births, all following the vaginal excision of a transverse vaginal septum.

Conclusions Transverse vaginal septae resected vaginally or laparoscopically have low complication rates and good long-term outcomes. Complex septae require more extensive surgery, with an increased risk of complications.

Keywords Obstructed menstruation, primary amenorrhoea, transverse vaginal septum, vaginal agenesis.

Linked article This article is commented on by Ridgeway B. p. 1659 in this issue. To view this mini commentary visit http://dx.doi.org/10.1111/1471-0528.12961.

Introduction

Transverse vaginal septae are a rare type of Mullerian anomaly. The exact incidence is unknown, but may be between 1/2100 and 1/72 000.1 Transverse vaginal septae are thought to result from a failure of canalisation of the vaginal plate at the point where the urogenital sinus meets the Mullerian duct. Septae can be perforate or imperforate, and vary in their thickness and location in the vagina. Imperforate septae present in adolescence with obstructed menstruation and haematocolpos. Women with a perforate septum often have normal menses and usually present with difficulties with intercourse or tampons.

Clinical examination, ultrasound, and magnetic resonance imaging (MRI) are all used in diagnosis and pre-operative planning.1 Treatment involves surgical resection of the septum and anastamosis of the proximal and distal vaginas. This can be performed vaginally, laparoscopically, or via an abdominoperineal approach, depending on the location and thickness of the septum.2,3 It is essential that accurate information on the septum is available to ensure that the correct operative approach is chosen.
There is little guidance available in the medical literature regarding either the classification of transverse vaginal septae or the choice of surgical technique, however. In addition, there is scanty published data on short- or long-term outcomes following the resection of transverse vaginal septae. Complications may be significant and include vaginal stenosis and reobstruction (recurrence), dyspareunia, endometriosis, infertility, obstetric complications, and psychological difficulties, although there is no long-term follow-up data for this.

The aim of this study was to describe the presentation, assessment, treatment, and outcomes in 46 girls and women with a congenital transverse vaginal septum. Better information will improve clinical decision-making and patient information.

**Methods**

This was an observational study performed in a tertiary referral centre with expertise in complex Müllerian anomalies, reconstructive surgery, and minimal access surgery. This study was approved by the National Research Ethics Service and by the local research and development department (ref. no. 11/H0721/11). Patients were identified from the departmental surgical database, and all patients presenting with a diagnosis of transverse vaginal septum between 1998 and 2012 were included in the study.

The study consisted of two parts: (1) all medical records were reviewed for information regarding clinical presentation, vaginal examination, imaging, including magnetic resonance imaging (MRI) and ultrasound, surgical management, short- and long-term complications, and the need for dilation therapy; (2) postal questionnaires were sent to all patients over the age of 16 years who had undergone surgery. Information was collected about menstruation, sexual intercourse, fertility and pregnancy details. Examples of questions include: ‘Have you had periods since your operation?’ ‘Are your periods painful?’ ‘If you find sexual intercourse painful, have you been investigated for that?’ ‘Has it ever taken you longer than 12 months to fall pregnant?’ and ‘How many times have you been pregnant?’ Those who did not return the questionnaire were contacted and re-sent the questionnaire.

**Classification of septae**

Septae were categorised using local protocol, by location, thickness, and presence or absence of a perforation (Table 1). The location is based on the distance from the vaginal introitus to the distal end of the septum. This is assessed where possible with vaginal examination in the clinic, but in younger patients an examination under anaesthetic is required.

If the septum is perforate, the thickness can usually be determined upon vaginal examination. For imperforate septae, the thickness of the septum is measured on MRI. The upper margin of the septum is the distal end of the proximal obstructed vagina, and this is easily visualised. The proximal margin of the distal vagina is identified as being the most proximal margin of normal vaginal mucosa and secretions as determined on transverse and sagittal T2-weighted images. The thickness of the septum is measured as the distance between these two observed markers. All MRIs are reported by a consultant radiologist with a special interest in complex Müllerian anomalies. Statistical analysis was performed using SPSS 22 (IBM, Armonk, NY, USA).

**Results**

There were 46 cases of transverse vaginal septae managed throughout the study period. Twenty-eight patients (61%) were imperforate, and presented with obstructed menstruation (with one case having cyclical haematuria secondary to a congenital vesicovaginal fistula). Twelve patients (27%) presented with an inability to insert tampons, have sexual intercourse, or have smears. The remaining six patients (13%) presented with primary infertility (n = 2), failure to progress in labour (n = 1), painless lump in the vagina (n = 1), offensive discharge (n = 1), and an incidental finding on ultrasound scan (n = 1). The mean age at presentation for obstructed septae was 14.3 years (SD 2.75 years), and for non-obstructed septae was 24.0 years (SD 7.77 years), with an overall average age of 18.3 years (SD 7.19 years).

Fourteen patients (30%) had already undergone a previous unsuccessful operation for menstrual obstruction prior to referral to our specialist unit. Twelve had incision and drainage only, and two had septum resection, with all patients presenting with reobstruction. Thirty-three out of 46 patients (72%) had magnetic resonance imaging (MRI) as part of their investigative work-up, either in the referring hospital or in our specialist centre. All patients with obstructed menstruation were either already on or were prescribed menstrual suppression, with either continuous combined oral contraceptive (COCP) or gonadotrophin-releasing hormone analogues (GnRHAs) prior to their definitive procedure.

Thirty-two (72%) of the septae were low, ten (22%) were in the mid-vagina, and three (6%) were high. Twen-

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Table 1. Classification of septae

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<tr>
<th>Location (Distance from vaginal introitus to the distal end of septum)</th>
<th>Low &lt;3 cm</th>
<th>Mid 3–6 cm</th>
<th>High &gt;6 cm</th>
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<tr>
<td>Thickness</td>
<td>Thin &lt;1 cm</td>
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<tr>
<td>Perforation</td>
<td>Perforate</td>
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ty-one (46%) were thick and 25 (54%) were thin. Eighteen (39%) of the septae had a perforation and so the patients had menstruated normally (Table 2).

### Surgical management

**Abdominoperineal approach**

Fifteen patients (33%) were managed with abdominoperineal vaginoplasty via laparotomy, with one case requiring the use of bowel. All of these septae were perforate. Eleven of 15 patients (73%) had a septum thicker than 2 cm (based on examination under anaesthesia and MRI findings), indicating a potential need for a section of intestine to bridge the gap between the proximal and distal vaginas. The other four patients had co-existing anomalies, including vesicovaginal or rectovaginal fistulae, longitudinal vaginal septum, and previous surgery for a cloacal anomaly. Six patients (40%) had undergone previous surgery for the septum in the referring hospital.

Four patients (27%) had short-term complications. One patient had an inadvertent transection of an abberant left common iliac artery, which was repaired in theatre. There were no long-term consequences following this. Other complications were a wound infection, pyometra, and right lower lobe pneumonia. Fourteen of 15 patients (93%) were asked to use vaginal dilation following abdominoperineal vaginoplasty. One patient had severe learning difficulties and so was unable to dilate, but had normal periods following surgery. Five patients (33%) re-presented with recurrent menstrual obstruction, and one (7%) re-presented with vaginal stenosis and dysmenorrhoea (although this was thought to be secondary to endometriosis, rather than vaginal stenosis). One case of reobstruction and the case of vaginal stenosis had not dilated after their initial surgery, and two cases of reobstruction were in girls who had undergone previous unsuccessful operations in the referring hospital. The case of vaginal stenosis was treated with vaginal dilation therapy. Two patients who reobstructed (40%) subsequently went on to have hysterectomies and those patients who reobstructed (60%) had repeat vaginal reconstruction, which required an intestinal segment in one patient. Two patients (4%) had rectovaginal fistulae. In one case this was already present at referral following reconstructive surgery in Japan.

In the second case a small low fistula resulted following an unsuccessful ileovaginoplasty. This was managed conservatively and did not require surgery.

### Vaginal approach

Twenty-seven patients (59%) were operated upon using a vaginal approach, including all of the perforate septae. Twenty-five patients (93%) underwent a simple excision of the septum, but two (7%) required rotation of perineal skin flaps to bridge the vaginal defect and ensure a normal calibre vagina. There were no short-term complications in this group. Five out of 27 patients (17%) were asked to perform vaginal dilation after surgery. This was recommended in cases where skin flaps were used and where there was significant scarring from previous surgery. There were two cases of vaginal stenosis (7%), which were treated by vaginal dilation therapy. One of these cases was a perforate septum and the other was imperforate. One case had a tear following intercourse, which required suturing in theatre.

### Laparoscopic resection

Three patients (6%) had a laparoscopic resection of a transverse vaginal septum. In these patients the septae were high/mid, thick (<2 cm), and perforate. All patients had undergone previous surgery in their referring hospital but re-obstructed. There were no short- or long-term complications in this group. All patients were advised to dilate following surgery; however, one girl could not manage dilation because of her young age.

One case did not have surgery. This patient had resection of a transverse vaginal septum in Ghana aged 15 years, and presented with primary infertility aged 31 years. She was found to have a high thick transverse vaginal septum, septate uterus, hydrosalpinges, extensive endometriosis, and dense pelvic adhesions. She was sexually active and having periods. The septum was deemed inoperable by the multi-disciplinary team because of the potentially hazardous surgery and a low probability of achieving a pregnancy.

### Endometriosis

Nineteen patients had either a laparotomy or laparoscopy as part of their assessment or treatment. Nine of these patients (48%) had documented evidence of endometriosis. The incidence of endometriosis for low, mid, and high septae was 42, 50, and 100%, respectively. All septae were imperforate.

### Long-term outcomes

The median length of follow-up after surgery was 10 months (ranging from 6 weeks to 13 years). Thirty-eight patients were sent questionnaires and 23 (61%) were returned; nine (39%) had been perforate and four (61%) imperforate. The surgical management in those who

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returned the questionnaire included abdominoperineal vaginoplasty \( (n = 9, 39\%) \), simple vaginal excision of septum \( (n = 13, 57\%) \), and vaginal excision with skin flaps \( (n = 1, 4\%) \). All patients were having periods except one who had a hysterectomy.

17/23 (74\%) had been sexually active. Ten patients (59\%) described dyspareunia; however, only six (35\%) had been investigated for this condition. Of these, three had had perforate septae and three had had imperforate septae. Three (50\%) had undergone a laparotomy; however, none had documented evidence of endometriosis. One patient was found to have vaginal stenosis, which was treated with vaginal dilation therapy. Eight out of 22 patients (36\%) complained of dysmenorrhoea requiring analgesia. Four (50\%) of these patients had undergone a laparotomy, with three (75\%) having evidence of endometriosis.

There were seven pregnancies in seven patients, with only one taking more than a year to get pregnant. None of the patients who returned the questionnaire have been unable to conceive. All pregnancies were in the group who had vaginal excision of transverse vaginal septum, as the septae were all thin (four perforate and three perforate). So far none of the patients with a thick septum have attempted to conceive. There was one early termination and six live births (one at 33 weeks of gestation and five at term). Three patients (50\%) had spontaneous vaginal deliveries (SVDs) and three (50\%) had caesarean sections, all without complications.

**Discussion**

**Main findings**

Traditionally, transverse vaginal septae have been classified as low, medium, or high depending upon their position in the vagina. This classification has never been systematic and a variety of measurements have been used. The European Society of Human Reproduction and Embryology (ESHRE) and the European Society for Gynaecological Endoscopy (ESGE) have developed a new classification system for Müllerian anomalies, in which transverse vaginal septae are assigned to subclass V3; however, transverse vaginal septae are not classified any further within this new classification system.\(^4\)

The largest series in the literature reported 26 imperforate septae, and classified these as being in the lower, middle, or upper third of the vagina.\(^2\) They did not specify measurements. In addition, despite recommending that septal thickness was measured, the study did not classify thickness further, and did not correlate this with outcome.\(^2\) The incidence of low, mid, and high septae in that study were 19, 35, and 46\%, respectively, which is very different from the imperforate septae in our current study (75, 21, and 4\%, respectively). This may arise from the different methods of classification. The only other large published series available is a literature review of 19 case reports, which included 73 patients with transverse vaginal septae.\(^5\) This review categorised septae in terms of location (low, mid, high) and presence of a perforation, but thickness was not documented. Management was described but definitive surgery was not discussed, and no long-term outcomes were reported. This is the first time that thickness has been included in the classification of transverse vaginal septae.

Thickness of transverse vaginal septae is important as it affects surgical management, and therefore the short- and long-term outcomes. It is accepted that low thin septae and thin perforate septae are less complex, and can be resected vaginally with a low complication rate. It is important that the entire septum is resected to prevent re-stenosis and scarring. Obstructed, mid, high, and thick septae are more complex, as approaching a mid or high septum blindly though the vagina increases the risk of trauma to adjacent organs. Thick septae may be difficult to remove and may leave a defect in the vagina between the proximal and distal vaginas. In our centre we use a section of intestine to bridge the vaginal gap if required, but skin grafts have also been reported for this purpose.\(^6\) In both patients in this study, intestinal vaginoplasty was indicated as they had already had prior unsuccessful vaginal reconstruction. Insertion of a skin graft onto scarred skin is unlikely to be successful. In general, we do not use skin grafts in our centre because the majority of our patients have already had unsuccessful surgery elsewhere. In addition, skin grafting has a high risk of vaginal stenosis and leads to unsightly scarring in the donor region. The potential requirement for grafting should be determined in advance of the procedure to allow informed consent and appropriate preparation for surgery. Referral to a specialist centre allows preoperative planning by a multidisciplinary team. MRI is widely used to delineate pelvic anatomy, and has been found to correlate well with clinical findings when assessing Müllerian and vaginal anomalies.\(^7,8\)

We have previously reported on the laparoscopic resection of transverse vaginal septae. It is a safe and effective technique in a select number of patients where a laparotomy would otherwise be required.\(^3\) Septae that are mid or high, <2 cm thick, with an adequately distended proximal vagina, and no other complex pelvic anomalies are suitable for laparoscopic resection. Where the septum is >2 cm in thickness there is a possibility that a bowel segment may be required to bridge the gap between the proximal and distal vaginas. In these patients, an abdominoperineal approach is recommended. Abdominoperineal vaginoplasties often involve complex reconstructive surgery, and therefore long-term complications such as reobstruction and fistulae are more common.\(^9\)
Our data demonstrated good short-term outcomes for all low and perforate transverse septae. Outcomes in high thick septae were poorer, with a high chance of repeat surgery as well as major complications such as rectovaginal fistulae and hysterectomy. In the study of transverse vaginal septae by Rock et al., the re-stenosis rate was not discussed. The only other available data are from a retrospective study of presentation and long-term outcomes of obstructive vaginal anomalies. This study contained only three patients of transverse vaginal septae, which were low and mid, and all perforate. Thickness was not described. Two out of the three septae developed vaginal stenosis requiring re-excisions. Patients and surgeons need to be aware of the complexity and risks involved in managing mid or high, thick septae.

Given the young age of this group, there is little fertility data. Of the seven patients (15% of the study group) who conceived, all had thin septae (four imperforate and three perforate). Rock et al. showed a significantly reduced chance of conception following resection of transverse vaginal septum, compared with imperforate hymen, and mid and high septae had a lower chance of conception than low septae. The cause for this has not yet been determined and vaginal stenosis may be a contributory factor; however, they also reported similarly high rates of endometriosis in mid and high septae. The incidence of endometriosis in the general population is approximately 10%, and this is known to be significantly increased in obstructed Müllerian anomalies thought to be secondary to retrograde menstruation. Corrective surgery for the obstructed anomaly has been found to result in the complete resorption of the endometriosis. Previous studies have suggested that patients with a high transverse vaginal septum have a higher incidence of endometriosis, compared with mid and low septae. We have found a higher incidence in thick septae, which have a shorter proximal vagina and therefore less distensible space for obstructed menstrual blood, perhaps increasing retrograde menstruation.

Vaginal dilation is usually recommended after reconstructive vaginal surgery to maintain vaginal capacity and prevent stenosis or reobstruction, although there is little evidence base to support this. Dilation is recommended in all patients following laparoscopy or laparotomy, and in vaginal patients where skin flaps have been used or if there is significant scarring. Dilation should commence within a few days of surgery. If compliance is poor, there is an increased risk of reobstruction requiring more complex reconstructive surgery. In this study reobstruction was significantly more likely in women who could not or would not dilate. Dilation is often described by women as uncomfortable, time-consuming, and a constant reminder of their abnormality. It is imperative that the patients are enrolled in a dedicated dilation programme, with support from a clinical nurse specialist and psychologist.

**Strengths and limitations**

This study comes under the theme of fundamental progress research and complies with good methods for prognostic research, as described by the PROGRESS partnership group. This is the largest study on transverse vaginal septae in the medical literature, and is the first time that septae have been classified according to location and thickness as well as presence of a perforation. This is also the largest study reporting outcome data and the first to correlate this classification with outcomes of surgery. The main drawback of this study is that it is a retrospective review; however, given the rarity of this condition, the large numbers in this study are likely to be representative of this unusual condition, and the study does provide useful data. The patient questionnaire provides further follow-up data where available, although the young age of this population means that long-term reproductive outcome data are limited. There may be a response bias within the questionnaire: for example, those women who have not been able to conceive may not have wanted to return the questionnaire. The questionnaires were sent to only 38 patients, however, as they were all over the age of 16 years, long-term outcomes on sexual intercourse and fertility are likely to be representative of the sample.

**Interpretation**

Transverse vaginal septae should be managed within specialist centres for complex gynaecology with experience in managing congenital gynaecological anomalies. This allows for the careful assessment of septae, to ensure the best surgical approach. In addition, knowledge of the type of septum allows the prediction of the likelihood of success and risk of complications. Our centre has 20 years of experience in managing these patients under the care of a specialist multidisciplinary team.

**Conclusion**

This study shows that transverse vaginal septae that are suitable for vaginal or laparoscopic resection are associated with low complication rates and good reproductive outcomes. More complex septae require more extensive reconstructive surgery, with an increased risk of complications. Further long-term studies are required to fully assess the long-term reproductive outcomes following resection of transverse vaginal septae.

**Disclosure of interests**

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Contribution to authorship
CEW, RSN, and SMC were all involved in the conception, planning, carrying out and analysing data from the study, and in writing the article. AC, DW, MAHC, and SHP were involved with analysing data and writing the article.

Details of ethics approval
This study was approved by the local Research and Development Department and the National Research Ethics Service, NRES Committee London – City Road and Hampstead (18 October 2011, ref. no. 11/H0721/11).

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