Supplementary Tables

Imperforate Hymen: A Comprehensive Systematic Review

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### Supplementary Table S1. Checklist summarizing compliance with PRISMA guidelines

| Topic | # | Checklist Item | Reported on page # |
|-------|---|----------------|--------------------|
| TITLE |  | Identify the report as a systematic review, meta-analysis, or both. | 1 |
| ABSTRACT |  | Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria; participants, and interventions; study appraisal and synthesis methods; results, limitations; conclusions and implications of key findings, systematic review registration number. | 2 |
| INTRODUCTION |  | Describe the rationale for the review in the context of what is already known. | 3 |
| |  | Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS). | 3-4 |
| METHODS |  | Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number. | N/A |
| |  | Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale. | 4-5 |
| |  | Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched. | 4-5 |
| |  | Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated. | 4-5 |
| |  | State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis). | 4-5 (Figure 1) |
| |  | Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators. | 4-5 |
| |  | List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made. | Supplementary Tables and Tables |
| |  | Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis. | N/A |
| |  | State the principal summary measures (e.g., risk ratio, difference in means). | N/A |
| |  | Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis. | N/A |
| Section/topic | # | Checklist Item | Reported on page # |
| Risk of bias across studies | 15 | Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies). | N/A |
| Additional analyses | 16 | Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified. | N/A |
| RESULTS |  | Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram. | Figure 1 |
| Study characteristics | 18 | For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations. | Supplementary Table 1 |
| Risk of bias within studies | 19 | Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12). | N/A |
| Results of individual studies | 20 | For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot. | 5-8, Tables, Supplementary Table |
| Synthesis of results | 21 | Present results of each meta-analysis done, including confidence intervals and measures of consistency. | 5-8, Tables, Supplementary Table |
| Item   | Description                                                                 | Supplementary Table |
|--------|-----------------------------------------------------------------------------|---------------------|
| 22     | Present results of any assessment of risk of bias across studies (see Item 15). | Tables              |
| 23     | Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression) (see Item 16). | N/A                 |
| **DISCUSSION** |                                                        |                     |
| 24     | Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers). | 8-10                |
| 25     | Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias). | 9-10                |
| 26     | Provide a general interpretation of the results in the context of other evidence, and implications for future research. | 10                  |
| **FUNDING** |                                                        |                     |
| 27     | Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review. | 10                  |

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097
Supplementary Table S2. List of case-reported characteristics including presenting symptoms as well as treatment outcomes and comorbidities

| Author(year)       | Age            | Patient’s country | Gynecological history | Presenting symptom(period)                                                                 | Combined abnormality                                                                 | Number of doctor(s) for diagnosis | Treatment                                   | Amount of drained fluid after treatment(mL) | Outcome |
|-------------------|----------------|-------------------|-----------------------|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------|---------------------------------------------|---------------------------------------------|---------|
| Bekaert et al. (2018) [1] | 14 years old  | Belgium           | -                     | Chronic back pain Abdominal pain                                                          |                                                        | -                                  | Hymenotomy                                | -                                           | Improved |
| Reggiani et al. (2018) [2] | Neonate (8 days old) | Mozambique        | -                     | Fever, septic condition Abdominal distention Thoraco-abdominal respiration Tense bulgingmembrane at vaginal introits, | Obstructive uropathy subsequent urosepsis, bladder perforation. | -                                  | Laparotomy                                | -                                           | Improved |
| Elshiani et al. (2018) [3] | 27 years old  | Kosovo            | -                     | Problems with sexual intercourse. Problems with pregnancy and cesarean delivery            |                                                        | -                                  | Hymenectomy                                | -                                           | Improved |
| Ghafri et al. (2018) [4] | 15 years old  | Oman              | -                     | Amenorrhea Abdominal distension                                                           | Obstructed hemivagina and ipsilateral renal anomaly (OHVIRA) syndrome               | -                                  | (Only recommended vaginoscopy and laparoscopy with vaginal septal resection) | -                                           | -       |
| Brito et al. (2018) [5] | 19 years old  | Brazil            | -                     | Amenorrhea Cyclic periodic lower abdominal and pelvic pain Abdominal distension           |                                                        | -                                  | Hymenotomy Oral antibiotics              | 3000                                        | Improved |
| Kotter et al.(2017) [6] | 14 years old  | USA               | -                     | Intermittent lower abdominal pain(3weeks) Abdominal distension, constipation, breast tenderness |                                                        | -                                  | Hymenectomy                               | 900                                         | Improved |
| Saleh et al. (2017) [7] | 12 years old  | USA               | Precocious puberty    | Abdominal pain (2 weeks) Urinary frequency (few weeks) Non bloody emesis Primary amenorrhea | Endometriosis                                                        | -                                  | Hymenectomy                               | -                                           | Improved |
| Ramareddy et al.(2017) [8] | Neonate (1 week) | India             | Peter plus syndrome   | Bilateral corneal opacity syndrome Renal failure                                         | Bilateral hydrouretreone phrosis                                                        | -                                  | Hymenectomy                               | -                                           | Improved |
| Authors             | Age   | Country | Presenting Symptoms                                      | Previous Treatment                  | Improved |
|---------------------|-------|---------|----------------------------------------------------------|-------------------------------------|----------|
| Ramareddy et al.    | 12 yrs| India   | Abdominal pain, Bladder distension, Anuria               | Hymenectomy                         | Improved |
|                     | 9 yrs | India   | Irritative and obstructive bladder                       | Vesicoureteral reflux               | Stage repair | Improved |
|                     | Neonate(2 weeks)| India | Pubic diastasis                                         | Bladder extrophy-epispadias complex| Hymenectomy | Improved |
|                     | 14 yrs| India   | Primary amenorrhea, Cyclic abdominal pain                | Hymenectomy                         | Improved |
|                     | 11 yrs| India   | Primary amenorrhea, Cyclic abdominal pain                | Hymenectomy                         | Improved |
|                     | 12 yrs| India   | Acute urinary retension                                 | Hymenectomy                         | Improved |
|                     | 11 yrs| India   | Abdominal pain, Acute urinary retension                 | Hymenectomy and vaginoplasty       | Improved |
| Zhang et al.        | 13 yrs| China   | Amenorrhea, Intra-labialal and pelvic mass(4months)     | Hymenectomy                         | Improved |
| Adam et al.         | 3 yrs | South Africa | Recurrent UTI, Distended bladder | McKusick-Kaufman syndrome (MKKS) | Hymenectomy | Improved |
| Elgyoum et al.      | 16 yrs| Sudan   | Cyclic lower abdominal pain, palpable suprapubic mass, primary amenorrhea | Hymenectomy                         | Improved |
| Ramphul et al.      | Neonate| UK     | -                                                        | Hymenectomy                         | Improved |
| Laghzaoui et al.    | 16 yrs| Morocco | Cyclic pelvic pain(4years)                               | Hymenectomy                         | Improved |
|                     | 3 days| India   | Abdominal distension, Lower limb swelling               | Bilateral hydronephrosis            | Hymenectomy | Improved |
| Nagaraj et al.      | 23 days| Ethiopia| Abdominal swelling, Urinary retention, Tachypnea(20 days), Renal failure | Bilateral hydronephrosis, Hymenectomy | 1250     |
| Tilahun et al.      | 13 yrs| Switzerland | Primary amenorrhea, Severe back pain, Urinary incontinence | Hymenectomy                         | 1400     |
| Löllgen et al.      | 16 yrs| Egypt   | 3 hymenectomy, lower abdominal pain, Urinary retention, | Hymenectomy                         | Improved |
| Ossman et al.       | 16 yrs| Egypt   | -                                                        | Hymenectomy                         | Improved |
| Study                                | Age     | Country | Findings                                                                 | Treatment                                                                 | Cost (if available) | Outcome  |
|--------------------------------------|---------|---------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------|----------|
| Segal et al. (2015) [18]             | 13 years| USA     | Labial Adhesions (treated topical estrogen)                                | Mild dysmenorrhea Inability to insert a tampon.                            | -                   | Improved |
|                                      |         |         |                                                                           |                                                                            |                     |          |
| Segal et al. (2015) [18]             | 16 years| USA     | -                                                                         | Dysmenorrhea Inability to insert a tampon.                                | -                   | Improved |
|                                      |         |         |                                                                           |                                                                            |                     |          |
| Al-Hunaidi et al. (2015)[19]         | 23 years| Kuwait  | Hymenotomy for imperforate hymen                                           | Urinary retention (1day) Amenorrhea(6months)                              | -                   | 1        |
|                                      |         |         |                                                                           |                                                                            | Hymenectomy         | Improved |
|                                      |         |         |                                                                           |                                                                            | 1200                |          |
| Glavan et al. (2015)[20]             | 16 months| Croatia | -                                                                         | Redness and edema of vaginal ostium                                       | -                   | 2        |
|                                      |         |         |                                                                           |                                                                            | Observation         | -        |
|                                      |         |         |                                                                           |                                                                            |                     |          |
| Lynn Coppola(2016)[21]               | Adolescent| Ghana | Irregular menstruation                                                     | Urinary retention Leg pain                                                | -                   | 1        |
|                                      |         |         |                                                                           |                                                                            | Hymenectomy         | Improved |
|                                      |         |         |                                                                           |                                                                            | 500                 |          |
| Koyama-Sato et al (2015)[22]         | 16 years| Japan   | -                                                                         | Cycline lower abdominal pain Primary amenorrhea                           | Transverse         | 2        |
|                                      |         |         |                                                                           |                                                                            | vaginal septum      | Hymenectomy |          |
|                                      |         |         |                                                                           |                                                                            | Vaginal septum repair| -        |
|                                      |         |         |                                                                           |                                                                            |                     |          |
| Greene et al.(2015)[23]              | 14 years| USA     | -                                                                         | Fecal frequency and urgency(1year) Urinary frequency(1year) Pelvic pain(1year) | -                   | 2        |
|                                      |         |         |                                                                           |                                                                            | Hymenectomy         | -        |
|                                      |         |         |                                                                           |                                                                            |                     | Improved |
| George et al.(2015)[24]              | 14 years| Germany | -                                                                         | Abdominal pain(1year) Poluria(1month) Primary amenorrhea                  | -                   | 1        |
|                                      |         |         |                                                                           |                                                                            | Hymenectomy         | Improved |
|                                      |         |         |                                                                           |                                                                            | Prophylactic antibiotics| 2400     |          |
| Ulku et al.(2015)[25]                | 15 years| Turkey  | Cyclic lower abdominal pain(1year)                                        | Escobar syndrome                                                       | -                   | 1        |
|                                      |         |         |                                                                           |                                                                            | Elliptical hymenotomy| Improved |
|                                      |         |         |                                                                           |                                                                            | 1000               |          |
| Plaza-Benhumea et al.(2014)[26]      | 12 years| Mexico  | -                                                                         | Lower abdominal pain(1day) Heavy bleeding per vaginal(1day)              | Langer–Giedion      | 1        |
|                                      |         |         |                                                                           |                                                                            | syndrome            | Hymenoplasty |          |
|                                      |         |         |                                                                           |                                                                            | Vaginal dilator therapy| -        | Improved |
| Ho et al.(2014)[27]                  | 14 years| Australia| -                                                                          | Langer–Giedion syndrome                                                 | -                   | 1        |
|                                      |         |         |                                                                           |                                                                            | Cruciate hymenotomy | -        |
|                                      |         |         |                                                                           |                                                                            |                     | Improved |
| Dilbaz et al.(2014)[28]              | 13 years| Turkey  | -                                                                         | Worsening lower abdominal pain(4months)                                 | Transverse         | 1        |
|                                      |         |         |                                                                           |                                                                            | vaginal Septum      | Hymenectomy |          |
|                                      |         |         |                                                                           |                                                                            | Laparotomy because of rupture of abscess                                | 200                 | Improved |
| Fischer et al.(2014)[29]             | 12 years| Canada  | Dyssuria(3days) Constipation(3days) Perineal pain and pruritus(3days)      | -                                                                          | -                   | 1        |
|                                      |         |         |                                                                           |                                                                            | Hymenectomy         | -        |
| Reference                  | Age     | Country | Main Symptoms                                                                 | Treatment                                      | Duration | Outcome   |
|----------------------------|---------|---------|--------------------------------------------------------------------------------|-----------------------------------------------|----------|-----------|
| Salhan et al. (2013) [30]  | 12 years| UK      | Acute urinary retention (1 day), Lower abdominal pain (1 day), Dysuria (1 day) | Cruciate hymenotomy                           | 1        | Improved  |
| Vitale et al. (2013) [31]  | 3 days  | Italy   | Abdominal mass                                                                  | Hymenotomy                                    | 100      | Improved  |
| Christodoulidou et al. (2013) [32] | 13 years | UK     | Lower abdominal pain (1 day), Urinary retention (1 day) | Cruciate hymenotomy                           | 3        | Improved  |
| Mwenda AS. (2013) [33]     | 14 years| Kenya   | Lower abdominal pain (1 week), Tenesmus (1 week)                                | X-shaped hymenotomy                           | 600      | Improved  |
| Domany et al. (2013) [34]  | 13 years| Israel  | Back pain (6 months), Loss of appetite (6 months)                               | Hymenotomy                                    | 1000     | Improved  |
| Rabani SM. (2013) [35]     | 11 years| Iran    | Cyclic abdominal pain (6 months), Urinary retention                              | Hymenotomy                                    | 1000     | Improved  |
| Rabani SM. (2013) [35]     | 13 years| Iran    | Lower abdominal pain (6 months), Urinary retention                              | Hymenotomy                                    | -        | Improved  |
| Gupta et al. (2013) [36]   | 11 years| India   | Lower abdominal pain (1 day), Dysuria (1 day), Transverse vaginal septum        | Hymenectomy, Excision of transverse vaginal septum followed by dilatation | -        | Fusion of vaginal septum (19 days) |
| Das et al. (2012) [37]     | 15 years| UK      | Urinary retention, Cyclic lower abdominal pain (12 months)                     | Hymenectomy                                    | 400      | Improved  |
| Mwampagatwa et al. (2012) [38] | 16 years | Tanzania | Urinary retention (1 day), Lower abdominal pain                                | Hymenectomy                                    | 1500     | Improved  |
| Sarathi et al. (2012) [39] | 18 months| India  | Appearance of pubic hair and breast enlargement (2 months), Vaginal atresia    | Vaginal pull-through procedure, GnRH agonist  | -        | Improved  |
| Eksioglu et al. (2012) [40] | 8 months| Turkey  | Fever of unknown origin, Bicornuate uterus                                     | Cruciate hymenotomy                           | 500      | -         |
| Nagai et al. (2012) [41]   | 35 days | Japan   | Abdominal distension, Bilateral leg edema, Venous distension, Renal failure    | Hymenectomy                                    | 100      | Improved  |
| Temizkan et al. (2012) [42]| 15 years| Turkey  | Lower abdominal pain (15 days)                                                 | Central hymenotomy                            | 700      | Improved  |
| Author et al.[year][citation] | Age | Country | Diagnosis | Treatment | Outcome | Details |
|--------------------------------|-----|---------|------------|-----------|---------|---------|
| Poll et al.[2011][43]          | 15 years | Germany | Back pain(15days) | Adominal pain(4days) | 1 | Hymenotomy | 2000 | - |
| Kurdoglu et al.[2011][44]      | 13 years | Turkey | Poll et al.[2011][43] | Abdominal pain | 1 | Self limited(upper half of hymen) | - | Improved |
| Ercan et al.[2011][45]         | 15 years | Turkey | Poll et al.[2011][43] | Lower abdominal pain | 2 | Vertical hymenotomy | 1000 | Improved |
| PDino et al.[2011][46]         | 12 years | Croatia | Poll et al.[2011][43] | Repeated urinary retention(1year) | 1 | Hymenectomy | 1500 | Improved |
| Khan et al.[2011][47]          | 19 years | UK | Poll et al.[2011][43] | Menstruation | 1 | Cruciate hymenotomy | 600 | Improved |
| Ameh et al.[2011][48]          | 2 days | Nigeria | Poll et al.[2011][43] | Persistent cloaca | - | Hymenotomy | - | Improved |
| Ameh et al.[2011][48]          | 3 days | Nigeria | Poll et al.[2011][43] | Persistent cloaca | - | Hymenotomy | - | - |
| Abu-Ghanem et al.[2011][49]    | Adolescent | Israel | Poll et al.[2011][43] | Simple vertical hymenotomy for imperforate hymen | 2 | Hymenectomy | 500 | Improved |
| Anselm et al.[2010][50]        | 14 years | Nigeria | Poll et al.[2011][43] | Urinary retention | 2 | Cruciate hymenotomy | 1000 | Improved |
| Zhou et al.[2010][51]          | Infant | China | Poll et al.[2011][43] | Systemic aplasia cutis congenita | - | - | - | Died (cause: asphyxia and dehydration) |
| Adenuga et al.[2010][52]       | Infant | USA | Poll et al.[2011][43] | - | - | - | - | - |
| Drakonaki et al.[2010][53]     | 12 years | Greece | Poll et al.[2011][43] | Abdominal discomfort(48hours) | 1 | Hymenotomy | - | Improved |
| Kloss et al.[2010][54]         | 12 years | USA | Poll et al.[2011][43] | Lower abdominal pain(1month) | 1 | - | - | - |
| Mou et al.[2009][55]           | 12 years | Hong Kong | Poll et al.[2011][43] | Cyclic lower abdominal pain(2months) | - | - | Hymenotomy | 600 | Improved |
| Mou et al.[2009][55]           | 12 years | Hong Kong | Poll et al.[2011][43] | Lower abdominal pain(5months) | 1 | Hymenotomy | 500 | Improved |
| Name et al.(Year)[Ref] | Age | Country | Symptoms | Procedures | Costs | Results |
|------------------------|-----|---------|----------|------------|-------|---------|
| Mou et al.(2009)[55]   | 13 years old | Hong Kong | Tenesmus(5months) Dysuria(5months) Repeated lower abdominal pain(10months) labial adhesion | Mini-hymenotomy | 500 re-do hymenotomy (6th month after operation) |
| Oakes et al.(2010)[56] | 14 years old | USA | Pelvic pain(5months) Uterocervicovaginal septum | Hymenotomy, vaginal septoplasty | 400 Improved |
| Dhabalia et al.(2009)[57] | 25 years old | India | Primary infertility(4years) Dyspareunia(4years) Urethrovaginal fistula | Hymenotomy Excision of fistula | - Improved |
| Partsienevelos et al.(2009)[58] | 12 years old | UK | Cystic tumor evaluation Lower abdominal pain(2weeks) | Hymenectomy | 2 Improved |
| Basaran et al.(2009)[59] | 13 years old | Turkey | Lower abdominal pain Urinary retention | Midline vertical hymenotomy | - Improved |
| Oguzkurt et al.(2009)[60] | 6 years old | Turkey | High fever Abdominal pain Urethrovaginal fistula | Hymenotomy Simple closure of the fistula Extraction of vaginal canal | - Improved |
| Kalmantis et al.(2009)[61] | 15 years old | Greece | Lower abdominal pain(48hours) Dysuria Urinary frequency | Hymenectomy | 1500 Improved |
| Sharifaghdas et al.(2009)[62] | 20 days old | Iran | Abdominal distension Urinary retention | Small crossed hymenotomy | 100 Improved |
| Gyimadu et al.(2009)[63] | 12 years old | Turkey | Lower abdominal pain(24hours) Urinary retention(24hours) | Cruciate hymenotomy | 450 Improved |
| Johal et al.(2009)[64] | 2 days old | UK | Large interlabial swelling Urinary retention Vomiting | Hymenotomy | 100 Improved |
| Lardenoije et al.(2009)[65] | 16 years old | Netherland | Primary amenorrhea Cyclical abdominal pain(1year) | Hymenectomy | 500 Improved |
| Kumar et al.(2008)[66] | 11 years old | USA | Abdominal pain(2days) Lower back pain(2days) Dysuria | Hymenotomy | - Improved |
| Author et al. (Year) | Age | Country | Symptoms | Procedures | Cost | Outcome |
|----------------------|-----|---------|----------|------------|------|---------|
| Adali et al. (2009) | 12 years old | Turkey | Urinary retention, Lower abdominal pain (1 month), Urinary hesistancy (1 week) | Cruciate hymenotomy | 1000 | Improved |
| Hsu et al. (2008) | 12 years old | Taiwan | Lower abdominal pain, Urinary retention | Laparoscopic adhesiolysis, Cautery of the endometriosis | - | Improved |
| Hijazeen R. (1998) | 5 days old | Jordan | Diarrhea, Rapid breathing, Poor feeding | Hymenotomy | - | Improved |
| Chang et al. (2007) | 12 years old | Taiwan | Urinary retention (12 hours), Lower abdominal pain | Cruciate hymenotomy | - | Improved |
| Buyukbayrak et al. (2008) | 13 years old | Turkey | Urinary retention, Abdominal distention, Abdominal discomfort | Transverse vaginal septum, Unicornuate uterus | - | Improved |
| Deligeoroglou et al. (2007) | 14 years old | Greece | Lower abdominal pain, Urine retention, Non-specific abdominal complaints | Hymenectomy, Excision of transverse vaginal septum | 200 | Improved |
| Dane et al. (2007) | 16 years old | Turkey | Lower abdominal pain (7 days), Urinary retention (5 days) | Cruciate hymenotomy | 500 | Improved |
| Dane et al. (2007) | 14 years old | Turkey | Urinary retention (2 days), Lower abdominal pain (2 days) | Cruciate hymenotomy | - | Improved |
| Khemchandani et al. (2007) | 11 months old | India | Straining during urination, Repeated urinary retention | Cruciate hymenotomy | - | Improved |
| Bajaj et al. (2006) | Infant | UK | Bulging mass at the vaginal introitus | Cruciate hymenotomy | 200–300 | Improved |
| Walsh et al. (2006) | 14 years old | USA | Abdominal pain (2 days), Back pain (2 days), Urinary retention | Hymenectomy | 1000 | - |
| Shen et al. (2006) | 2 years old | Taiwan | Fever of unknown origin (4 days), Lethargy, Loss of appetite | Partial hymenotomy | 150 | Improved |
| Levensky et al. (2006) | 14 years old | USA | Repeated lower abdominal pain (2 months), Bicornuate uterus | Hymenotomy | 500 | Improved |
| Authors                  | Age       | Location       | Symptoms                                          | Diagnosis                          | Treatment         | Duration | Outcome |
|-------------------------|-----------|----------------|---------------------------------------------------|------------------------------------|-------------------|----------|---------|
| Aygun et al. (2006)     | 5 days    | Turkey         | Abdominal distension                              | Renal failure                      | -                 | 2        | Improved |
| Sakalkale et al. (2005) | 13 years  | New Zealand    | Familial history of imperforate hymen             | Lower abdominal pain(36hours) Urinary retention(36hours) | -                 | 1        | Hymenotomy 600 | Improved |
| Sakalkale et al. (2005) | 14 years  | New Zealand    | Familial history of imperforate hymen             | Cyclic lower abdominal Pain(3months) | -                 | 1        | Hymenotomy 400 | Improved |
| Eskandar et al. (2004)  | 15 years  | UK             | Familial history of imperforate hymen             | Primary amenorrhea Cyclic lower abdominal pain | Duplex left kidney | 2        | Hymenectomy | Improved |
| Eskandar et al. (2004)  | 17 years  | UK             | -                                                  | Primary amenorrhea Cyclic lower abdominal pain | Angiomyolipoma arises primarily in the kidneys | -        | Hymenectomy | Improved |
| Wang et al. (2004)      | -         | Taiwan         | -                                                  | chronic constipation and intermittent low back pain/6months | -                 | -        | -       |
| Posner et al. (2005)    | 22 days   | USA            | -                                                  | -                                  | -                 | -        | -       |
| Posner et al. (2005)    | 3 months  | USA            | -                                                  | -                                  | -                 | -        | -       |
| Posner et al. (2005)    | 4 months  | USA            | Familial history of imperforate hymen             | -                                  | -                 | -        | -       |
| Posner et al. (2005)    | 7 months  | USA            | -                                                  | -                                  | -                 | -        | -       |
| Posner et al. (2005)    | 21 months | USA            | -                                                  | -                                  | -                 | -        | -       |
| Posner et al. (2005)    | 2 years   | USA            | -                                                  | -                                  | -                 | -        | -       |
| Posner et al. (2005)    | 2.1 years | USA            | Familial history of imperforate hymen             | -                                  | -                 | -        | -       |
| Posner et al. (2005)    | 2.1 years | USA            | -                                                  | -                                  | -                 | -        | -       |
| Posner et al. (2005)    | 3.7 years | USA            | -                                                  | Dysuria                            | -                 | -        | -       |
| Posner et al. (2005)    | 10.9 years| USA            | -                                                  | Vomiting Lower abdominal pain      | -                 | -        | -       |
| Posner et al. (2005)    | 11.3 years| USA            | -                                                  | Abdominal pain Dysuria             | -                 | -        | -       |
| Posner et al. (2005)    | 11.5 years| USA            | -                                                  | Abdominal pain(1month) Back pain(1month) | -                 | -        | -       |
| Posner et al. (2005)    | 11.7 years| USA            | -                                                  | Dysuria Abdominal pain             | -                 | -        | -       |
| Posner et al. (2005)    | 12.2 years| USA            | -                                                  | Dysuria(1week)                     | -                 | -        | -       |
| Posner et al. (2005)    | 12.2 years| USA            | -                                                  | Abdominal pain(2weeks)             | -                 | -        | -       |
| Authors                  | Age      | Country | Comorbidities                                                                 | Symptoms                                                                 | Intervention   | Cost | Improvement |
|--------------------------|----------|---------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------|------|-------------|
| Posner et al. (2005)     | 12.3 yrs | USA     | -                                                                             | Urinary retention (1 day)                                                | -              | -    | -           |
| Posner et al. (2005)     | 13.3 yrs | USA     | -                                                                             | Lower abdominal pain (2 months)                                          | -              | -    | -           |
| Posner et al. (2005)     | 13.3 yrs | USA     | -                                                                             | Urinary retention (2 months) Back pain (2 months) Abdominal pain (2 months) | -              | -    | -           |
| Posner et al. (2005)     | 13.6 yrs | USA     | -                                                                             | Cyclic abdominal pain (4 months) Dysuria (4 months)                       | -              | -    | -           |
| Posner et al. (2005)     | 13.8 yrs | USA     | Familial history of imperforate hymen                                         | Abdominal pain (3 months)                                                | -              | -    | -           |
| Posner et al. (2005)     | 13.9 yrs | USA     | -                                                                             | Repeated abdominal pain (2 weeks) Dysuria (1 day)                         | -              | -    | -           |
| Posner et al. (2005)     | 14.2 yrs | USA     | -                                                                             | Abdominal pain (2 days)                                                  | -              | -    | -           |
| Stone et al. (2004)      | 11 yrs   | USA     | -                                                                             | Abdominal pain (24 hours) Nausea (2 days) Urinary frequency (2 days) Dysuria (2 days) | -              | 1    | Hymenotony 300 Improved |
| Lim et al. (2003)        | 14 yrs   | Malaysia | Familial history of imperforate hymen                                         | Cyclic abdominal pain (6 months)                                          | -              | 2    | Hymenectomy - Improved |
| Lim et al. (2003)        | 11 yrs   | Malaysia | Familial history of imperforate hymen                                         | Urinary retention (1 day) Abdominal pain (1 day)                          | -              | 1    | Hymenectomy 800 Improved |
| Chircop R. (2003)        | 13 yrs   | UAE     | -                                                                             | Lower abdominal pain (12 hours) Urinary retention (12 hours) Urinary frequency (2 days) Urinary urgency (2 days) | -              | 1    | Hymenotomy 1000 Improved |
| Wall et al. (2003)       | 12 yrs   | USA     | -                                                                             | Fever (3 days) Nausea (3 days) Vomiting (3 days) Lower abdominal pain (3 days) | -              | 2    | Hymenotomy - - |
| Kumar et al. (2002)      |          | India    | -                                                                             | Lower abdominal pain Urinary retention                                   | -              | -    | Hymenotomy - - |
| Kumar et al. (2002)      |          | India    | -                                                                             | Lower abdominal pain Urinary retention                                   | -              | -    | Hymenotomy - - |
| Authors                | Age       | Country   | Diagnosis                                                                 | Procedure                                  | Follow-up Time | Outcome     |
|-----------------------|-----------|-----------|---------------------------------------------------------------------------|---------------------------------------------|----------------|-------------|
| Hu et al.(2001)[89]   | Infant    | USA       | Non-immune hydrops, Respiratory distress                                  |                                             |                | Improved    |
| Botash et al.(2001)[90] | 9 years old | USA       | Physical abuse, Child abuse referral and evaluation program evaluation   |                                             | 3              | -           |
| Botash et al.(2001)[90] | 12 years old | USA      | Physical abuse, Child abuse referral and evaluation program evaluation   |                                             | 1              | -           |
| Botash et al.(2001)[90] | 3 years old | USA      | Possible sex abuse, Child abuse referral and evaluation program evaluation(for sibling’s abuse) |                                             | 1              | -           |
| Lok et al.(2001)[91]  | 13 years old | China    | Lower abdominal pain, Urinary frequency constipation                      | Cruciate hymenotomy                        | 1              | Iatrogenic pyocolpos from needle puncture |
| Stelling et al.(2000)[92] | 12 years old | USA      | Familial history of imperforate hymen, Evaluation for familial history of imperforate hymen | Hymenectomy                                | 1              | Improved    |
| Stelling et al.(2000)[92] | 14 years old | USA      | Familial history of imperforate hymen, Peritoneal signs                   | Hymenectomy                                | 1              | Improved    |
| Stelling et al.(2000)[92] | 14 years old | USA      | Familial history of imperforate hymen, Evaluation for familial history of imperforate hymen | Hymenectomy                                | 1              | Improved    |
| Anguenot et al.(2000)[93] | 14 years old | Switzerland | Cyclic lower abdominal pain, Urinary frequency constipation               | Radial hymenotomy                          | 1              | Improved    |
| Buick et al.(1999)[94] | 14 years old | UK       | Back pain, Urinary incontinence, Constipation, Sudden chest pain with swelling of the upper torso | Cruciate hymenotomy                        | 3              | 1000        |
| Ahmed et al.(1999)[95] | 12 years old | Australia | Repeated lower abdominal pain, Transverse vaginal septum                  | Cruciate hymenotomy, Perforation and dilatation of septum | 2              | Improved    |
| Cicinelli et al.(1999)[96] | -         | Italy     | Regular menstruation, Abdominal pain during menses, Ipsilateral renal agenesis | Hymenotomy, Resectoscopic repair          | 2              | Improved    |
| Hall DJ.(1999)[97]    | 15 years old | UK       | Lower abdominal pain                                                     | Hymenotomy                                 | 1              | 1500        |


| Authors             | Age | Country | Diagnosis                                                                 | Symptoms                                                                 | Procedure                                                                 | Complications | Improvement |
|---------------------|-----|---------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------|-------------|
| Bakos et al. (1999) | 13 years | Sweden | Urinary retention                                                         | Lower abdominal pain (12 hours)                                            | X-shaped hymenotomy                                                      | 400           | Improved    |
|                     |     |         |                                                                           | Nausea (12 hours)                                                        | Laparotomy for resection of ruptured right fallopian tube                 |               |             |
|                     |     |         |                                                                           |                                                                           | Salpingostomy for obliterated left fallopian tube                         |               |             |
| Pierce JT. (1999)   | 14 years | USA | Sexual abuse                                                              | Urinary incontinence                                                      | Perforation and dilatation of hymen                                       | -             | -           |
| Kushner et al. (1997) | 13 years | USA | Urinary incontinence                                                     | Cyclic lower abdominal pain (3 months)                                   | Partial hymenectomy                                                      | 400           | Improved    |
| Tuncer et al. (1997) | 8 months | Turkey | -                                                                          | Acute abdomen, vomiting (4 days), Urinary retention (4 days), Constipation (4 days) | Rupture of bladder                                                        | 1             | -           |
|                     |     |         |                                                                           |                                                                           | Puncture of the hymen, Laparotomy for persisting symptom, Bladder suturing | 350           | -           |
| Brevetti et al. (1997) | 2 months | USA | -                                                                          | Abdominal distension (2 days), Irritability (2 days)                      | Hymenotomy                                                                | 240           | Improved    |
| Bamshad et al. (1996) | 5 years | USA | Familial history of ulnar mammary syndrome                                | -                                                                         | Ulnar Mammary Syndrome                                                   | -             | -           |
| Bamshad et al. (1996) | 11 years | USA | Familial history of ulnar mammary syndrome                                | -                                                                         | Ulnar Mammary Syndrome                                                   | -             | -           |
| Bamshad et al. (1996) | 6 years | USA | Familial history of ulnar mammary syndrome                                | -                                                                         | Ulnar Mammary Syndrome                                                   | -             | -           |
| Robberecht et al. (1996) | 13 years | Belgium | -                                                                          | Abdominal pain (4 days), Constipation (8 days)                           | Diamond-shaped hymenotomy                                                | 1000          | Improved    |
| Peterson-Sweeney et al. (1996) | 13 years | USA | -                                                                          | Dysuria, Urinary retention, Back pain (1 week)                           | Hymenectomy                                                              | 800           | Improved    |
| Loscalzo et al. (1995) | 13 years | USA | -                                                                          | Lower abdominal pain (1 week), Constipation (1 week)                    | Hymenotomy                                                               | 1200          | Improved    |
| Sanders et al. (1994) | 19 years | USA | Misdiagnosed as mullerian agenesis treated                                | Primary amenorrhea                                                        | Hymenectomy                                                               | 1200          | Improved    |
| Authors                | Age   | Country | Symptoms                                      | Intervention                                      | Cost  | Outcome |
|------------------------|-------|---------|-----------------------------------------------|---------------------------------------------------|-------|---------|
| Lodh et al.(1994)[108] | 40 years | India | Primary amenorrhea, Abdominal mass, Lower abdominal pain, Urinary retention | Hymenectomy, Removal of calculi in pelvis, Irrigation of vaginal cavity with antibiotic solution | -     | Improved |
| Usta et al.(1993)[109] | 13 years | Lebanon | Familial history of imperforate hymen, Cyclic lower abdominal discomfort | Cruciate hymenotomy                               | 1500  | Improved |
| Usta et al.(1993)[109] | 16 years | Lebanon | Familial history of imperforate hymen, Cyclic lower abdominal discomfort | Hymenotomy                                        | 1000  | -       |
| Usta et al.(1993)[109] | 8 years  | Lebanon | Familial history of imperforate hymen          | Observation                                       | -     | -       |
| Nisanian AC.(1993)[110] | 14 years | USA    | Urinary retention, Cyclic lower abdominal pain(2years) | Diamond-shaped hymenotomy, Hymenectomy, Prophylactic antibiotics | 2600  | Improved |
| Yu et al.(1993)[111]   | 16 years | Taiwan | Urinary retention                             | Hymenotomy                                       | 1000  | Improved |
| Yu et al.(1993)[111]   | 12 years | Taiwan | Urinary retention, Lower abdominal pain, Urinary frequency | Cruciate hymenotomy                               | 500   | Improved |
| Carlson et al.(1992)[112] | 14 years | USA    | Lower abdominal pain(3days), Urinary frequency | Didelphic uterus with double vagina, Hymenectomy   | 500   | Improved |
| Gangopadhyay et al.(1992)[113] | 1 day old | India | Inability to pass meconium, A balloon shaped mass in vulval area | Imperforate anus, Anal cut back operation         | 20    | -       |
| Catić et al.(1988)[114] | 16 years | Yugoslavia | Abdominal pain(15days), Pelvic pain(15days), Flatulence(15days), Constipation(15days) | Hymenotomy                                       | 1000  | -       |
| Catić et al.(1988)[114] | 15 years | Yugoslavia | Abdominal pain(2months), Back pain(2months)    | Surgical incision of the imperforate hymen        | 1000  | -       |
| Berkowitz et al.(1987)[115] | 6 years old | USA    | Sexual abuse                                  | Evaluation for sexual abuse, -                   | -     | -       |
| Dickson et al.(1985)[116] | 14 years | USA    | Familial history of imperforate hymen          | Partial hymenectomy                               | 400   | Improved |
| Author et al. | Age | Gender | Race | Symptoms | Findings | Procedure | Follow-up |
|--------------|-----|--------|------|----------|----------|-----------|----------|
| Dickson et al. (1985) [116] | 14 years old | USA | Familial history of imperforate hymen | Syncope | 1 | Partial hymenectomy | - |
| Shaw et al. (1983) [117] | Neonate | UK | - | Abdominal distention | Respiratory distress | - | Improved |
| Shaw et al. (1983) [117] | Neonate | UK | - | Anorectal atresia | Anorectal atresia | - | - |
| Shaw et al. (1983) [117] | Neonate | UK | - | Multiple anomalies | Cloaca | - | Died (cause: cardiorespiratory distress) |
| Shaw et al. (1983) [117] | Neonate | UK | - | Multiple anomalies | Congenital heart defect | - | Died (cause: respiratory distress) |
| Shaw et al. (1983) [117] | Neonate | UK | - | Multiple anomalies | Bicornuate uterus | - | Died (cause: respiratory distress) |
| Shaw et al. (1983) [117] | 13 years old | UK | - | Abdominal pain | Pelvic mass | - | - |
| Shaw et al. (1983) [117] | 13 years old | UK | - | Enuresis | - | - | - |
| Shaw et al. (1983) [117] | 13 years old | UK | - | Abdominal pain | Perineal bulge | - | - |
| Shaw et al. (1983) [117] | 15 years old | UK | - | Appendicitis | - | - | - |
| Shaw et al. (1983) [117] | 13 years old | UK | - | Appendicitis | Bilateral duplex ureter | - | - |
| Shaw et al. (1983) [117] | 14 years old | UK | Regular | Appendicitis | Double genital | - | - |
| Author(s) and Year | Age | Country | Menstrual History | Symptoms | Treatment | Side Effects | Outcome |
|-------------------|-----|---------|------------------|----------|-----------|--------------|---------|
| Shaw et al. (1983) | 11 years | UK | Regular menstruation | Abdominal pain, Abdominal mass | Double genital system | - | Improved |
| Iuchtmann et al. (1980) | 8 years | Israel | - | Lower abdominal pain | Left hypoplastic kidney with ectopic ureter, High aortic bifurcation | 2 | Hymenotomy, 250 | Improved |
| Amortegui et al. (1979) | 13 years | USA | Known imperforate hymen | Abdominal cramps (2 weeks) | Vaginal occlusion by an imperforate hymen | 1 | Hymenectomy, 200 | Improved |
| Nidecker et al. (1978) | Infant | Canada | - | Lower abdominal mass | Mild subluxation of the hips | 1 | Hymenotomy, - | Improved |
| Bejanga BL. (1978) | 16 years | Cameroon | - | General discomfort (3 weeks), Dysuria (1 week), Constipation (1 week) | Abdominal pain | 2 | Simple hymenotomy, 1700 | Reclosure (14 days) |
| Kahn et al. (1975) | 1 month | USA | - | - | - | 1 | Self-limited, - | - |
| Kahn et al. (1975) | Neonate | USA | - | - | - | 1 | Self-limited, - | - |
| Gazit et al. (1975) | 6 months | Israel | - | Inability to pass stools (3 days) | - | 1 | Hymenectomy, Prophylactic antibiotics, 250 | Improved |
| Hansen et al. (1975) | 13 years | Denmark | - | Abdominal pain | - | 1 | Hymenectomy, 500 | Vaginal adenosis (2 years) |
| Hansen et al. (1975) | 20 years | Denmark | - | Primary amenorrhea, Abdominal pain | - | 1 | Hymenectomy, 1100 | Vaginal adhesion (1 month) |
| Hansen et al. (1975) | 14 years | Denmark | - | Acute abdominal pain, Abdominal tumor | - | 1 | Hymenectomy, 1200 | Vaginal adhesion (5 weeks) |
| CECUTTI A. (1964) | 15 years | Canada | - | Abdominal distension (6 weeks), Abdominal discomfort (6 weeks) | - | 2 | Cruciate hymenotomy, Prophylactic antibiotics, 3000 | - |
| WHITESELL et al. (1963) | 14 years | USA | - | Acute urinary retention (18 hours), Cyclic lower abdominal pain (2 months) | - | 1 | Hymenectomy, 600 | Improved |
| Author(s)                          | Age   | Country | Complaints                                                                 | Procedure                  | Cost  | Outcome      |
|-----------------------------------|-------|---------|----------------------------------------------------------------------------|----------------------------|-------|--------------|
| W hite s e ll et al. (1963)        | 15 y s  | USA     | Lower abdominal enlargement, Cyclic lower abdominal pain, Dysuria         | Hymenectomy               | 950   | Improved     |
| W hite s e ll et al. (1963)        | 12 y s  | USA     | Acute urinary retention, Lower abdominal pain                             | Hymenectomy               | 150   | Improved     |
| W hite s e ll et al. (1963)        | 14 y s  | USA     | Back pain, Lower abdominal pain                                           | Hymenectomy               | 1000  | Improved     |
| Harpe r J. (1961)                 | 13 y s  | Canada  | Abdominal mass, Urinary frequency, Lower abdominal pain                   | Hymenectomy, Prophylactic Antibiotics | 3300  | Improved     |
| H y a t t H W Sr. (1960)           | 11 y s  | USA     | Cyclic lower abdominal pain                                               | Hymenectomy               | 325-300 | Reclosure of hymen(2W) |
| H y a t t H W Sr. (1960)           | 14 y s  | USA     | Hymenectomy for imperforate hymen, Lower abdominal pain, Nausea           | Hymenectomy               | 100   | Improved     |
| H y a t t H W Sr. (1960)           | 12 y s  | USA     | Abdominal mass, Urinary frequency                                         | Hymenectomy               | 1150  | Improved     |
| R o s e n t h a l et al. (1958)     | 13 y s  | USA     | Abdominal distention, Urinary urgency, Urinary frequency                   | Hymenectomy               | 700   | Improved     |
| R o s e n t h a l et al. (1958)     | 14 y s  | USA     | Lower abdominal pain                                                      | Hymenectomy               | 800   | -            |
| R o s e n t h a l et al. (1958)     | 15 y s  | USA     | Cyclic lower abdominal pain                                               | Hymenectomy               | -     | Improved     |
| R o s e n t h a l et al. (1958)     | 11 y s  | USA     | Lower abdominal mass, Abdominal discomfort                                | Hymenectomy               | 600   | Improved     |
| W arner et al. (1955)             | 16 y s  | USA     | Hymenotomy for imperforate hymen, Abnormal menstruation, Urinary retention | Hymenectomy, Dilatation of vaginal orifice | -     | -            |
| W arner et al. (1955)             | 16 y s  | USA     | Primary amenorrhea, Cyclic abdominal pain                                 | Hymenectomy, Laparotomy    | 400   | Improved     |
| W arner                        | 13 y s  | USA     |                                                                | Hymenotomy                | 473   | -            |
| Study | Age | Country | Symptoms | Treatment | Dosage | Outcome |
|-------|-----|---------|----------|-----------|--------|---------|
| Warner et al. (1955) [130] | 15 years old | USA | Primary amenorrhea, Urinary retention | Hymenotomy | 1000 | Reclosure (15 days) |
| Warner et al. (1955) [130] | 17 years old | USA | Lower abdominal pain, Abdominal mass, Amenorrhea | Cruciate hymenotomy, Antibiotics | 1000 | Improved |
| Daniel WW. (1950) [131] | 14 years old | USA | Cyclic lower abdominal pain, Headache | Hymenotomy | 470 | Improved |
| Crigler CM. (1946) [132] | 19 years old | USA | Menstruation | Surgical correction, Destruction of the urethral sphincter and bladder (2 years) | - | - |
| Doyle JC. (1942) [133] | 10 years old | USA | Dysuria (7 months), Vaginal fullness | Hymenectomy | - | Improved |
| Doyle JC. (1942) [133] | 16 years old | USA | Primary amenorrhea | Hymenectomy | - | Improved |
| Doyle JC. (1942) [133] | 14 years old | USA | Previously hymen opened | Amenorrhea | Hymenotomy | 3000 | Improved |
| Doyle JC. (1942) [133] | 15 years old | USA | Lower abdominal cramps (6 months), Back pain (2 weeks), Constipation, Hot flushes | Hymenectomy | 500 | - |
| Doyle JC. (1942) [133] | 12 years old | USA | Abdominal pain, Legs drawn up | Hymenectomy | 600-1000 | - |
| Doyle JC. (1942) [133] | 12 years old | USA | Abdominal pain (2 months), Back pain (2 months), Legs pain (2 months), Constipation (1 week), Dysuria (3 days), Oliguria (3 days) | Hymenotomy | 1000 | - |
| Doyle JC. (1942) [133] | 17 years old | USA | Lower abdominal pain (1 month) | Hymenectomy | 1000 | Improved |
| Doyle JC. (1942) [133] | 15 years old | USA | Abdominal pain, Back pain, Abdominal mass, Dysuria (3 weeks), Frontal headache, Hot and cold flushes | Hymenectomy | 800 | Amenorrhea (1 year) |
| Author          | Age     | Country | Symptoms                                                                 | Procedures                                                                 | Outcome        | Notes                                                                 |
|-----------------|---------|---------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------|----------------|-----------------------------------------------------------------------|
| Doyle JC. (1942) | 17 years| USA     | Abdominal pain (2 weeks) Abdominal distention (2 weeks)                   | Hymenectomy                                                                | 750            | Developed cicatricial stenosis in upper vagina (8 years)              |
| Doyle JC. (1942) | 14 years| USA     | Lower abdominal pain (5 days) Rapid weight gain (10 lb/4 months)          | Hymenotomy                                                                  | 700            | Improved                                                             |
| Doyle JC. (1942) | 13 years| USA     | Abdominal pain (6 weeks) Abdominal distention (6 weeks) Back pain         | Hymenectomy                                                                | 800            | Improved                                                             |
| Doyle JC. (1942) | 13 years| USA     | Suprapubic pain Frequency, dysuria Nocturia                               | Trochar puncture suction                                                   |                |                                                                       |
| Doyle JC. (1942) | 17 years| USA     | Regular menses from urethra Incontinence of urine                         | Hymenectomy Reparing urethrovaginal fistula                                 |                |                                                                       |
| Doyle JC. (1942) | 2 years | USA     | Hymenotomy 2 time previously for imperforate hymen                        | Vaginal irritation and tenderness                                           |                |                                                                       |
| Doyle JC. (1942) | 12 years| USA     | Abdominal mass (6 weeks) Urinary retention                                | Hymenotomy                                                                  | 500            | Improved                                                             |
| Doyle JC. (1942) | 17 years| USA     | Pelvic pressure Amennorhea                                                | Hymenectomy                                                                  |                |                                                                       |
| Doyle JC. (1942) | 15 years| USA     | Lower abdominal pain Nausea headache Back pain Listless                   | Hymenectomy                                                                  |                |                                                                       |
| Doyle JC. (1942) | 16 years| USA     | -                                                                          | Hymenectomy                                                                  |                |                                                                       |
| Doyle JC. (1942) | 14 years| USA     | Epileptic attacks (2 months)                                              | Hymenectomy                                                                  |                |                                                                       |
| Doyle JC. (1942) | 15 years| USA     | Crampy pain (18 months) Back pain Swelling in introitus                  | Hymenectomy                                                                  |                |                                                                       |
| Bingham et al. (1938) | 15 years | USA     | Amenorrhea Abdominal mass (10 months)                                     | Longitudinal hymenectomy                                                   | 1500           | Improved                                                             |
| McIlroy et      | 20 years| UK      | Familial history Amenorrhea                                               | Hymenectomy                                                                  |                |                                                                       |
| Author(s)                  | Age   | Country | Presence of Imperforate Hymen | Abdominal Mass | Cyclic Abdominal Pain | Frequent Urination | Treatment         | Improvement |
|---------------------------|-------|---------|-------------------------------|----------------|----------------------|--------------------|-------------------|-------------|
| McIlroy et al. (1930)     | 16 yrs| UK      | No familial history           | Abdominal mass | Cyclic back and     | Abdominal mass    | Hymenectomy       | Improved    |
|                           |       |         |                               |                | abdominal pain(6m)  |                    |                   |             |
|                           |       |         |                               |                |                      |                    |                   |             |
| McIlroy et al. (1930)     | 14 yrs| UK      | Familial history of           | Abdominal mass | Amenorrhea           |                   | Hymenectomy       | 945         | Improved    |
|                           |       |         | imperforate hymen             |                |                      |                    |                   |             |
| Roberts (1873)            | 20 yrs| UK      | Abdominal mass                | Abdominal mass | Dysuria              |                   | Hymenectomy       | 3000        | Improved    |

Abbreviations: USA; United States of America, UK; United Kingdom, UTI; Urinary tract infection
Supplementary Table S3. List of perinatal case-reported characteristics including presenting symptoms as well as treatment outcomes and comorbidities

| Authors and Year(s) | Age(year)/parity | Gestational age at diagnosis (or impression (week)) | Presenting problem | Image modality (prenatal):(predictable) impression or image finding | Combined abnormality (if it was not a presented problem) | Treatment | Amount of drained fluid after treatment (mL) | Outcome |
|---------------------|-----------------|----------------------------------------------------|-------------------|---------------------------------------------------------------|----------------------------------------------------------|-----------|---------------------------------------------|---------|
| Rodriguez et al. (2017) [137] | 31/G2P1 | 37+3 | Fetal abdominal cystic mass | US: fetal abdominal cystic mass with a fluid-debris level posterior to the bladder Postnatal US: Hydrometrocolpos secondary to imperforate hymen MRI: hydrometrocolpos | Left pelvic dilatation Left ureteral distension Poor kidney echogenocity | Hymenectomy | - | Improved |
| Alci Davutogluet et al. (2017) [138] | 35/G2P1 | 32 | Fetal ambiguous genitalia | US: hydrometrocolpos MRI: congenital imperforate hymen with hydrocolpos | - | Hymenotomy | 200 | Improved |
| Nakajima et al. (2015) [139] | 36/G6P4 | 28 | Fetal pelvic mass | US: liquid pelvic mass fMRI: imperforate hymen | - | Hymenotomy | - | Improved |
| Ayaz et al. (2011) [140] | 19/G1P0 | 25 | Fetal Abdominal cystic mass | US: hypoechoic mass | - | Left pevicalectasis | Hymenotomy | - | Improved |
| Dosedla et al. (2011) [141] | 39/G5P3 | 37+1 | Cardiotocographic exam. abnormality Growth retardation | US: hydrometrocolpos Down syndrome | - | Self-limited | - | - |
| Bhargava et al. (2009) [142] | 32/G1P0 | 34 | Fetal pelvic mass | US: pelvic mass | - | Hymenotomy | - | Improved |
| Tseng et al. (2008) [143] | 32/G1P0 | 36 | Fetal pelvic mass | US: pelvic mass MRI: congenital imperforate hymen with isolated hydrocolpos | - | Left hydrenephrosis | Hymenotomy | 80 | Improved |
| Yildirim et al. (2008) [144] | 28/G1P0 | 39 | Fetal abdominal cystic mass | US: hydrometrocolpos and imperforate hymen | - | Mild dilated renal pelvis | Hymenotomy | - | Improved |
| Adaletli et al. (2007) [145] | 35/G2P1 | 18 | Fetal bilateral hydrenephrosis | US: megacystis-microcolon-intestinal hypoperistalsis Syndrome | - | Hymenotomy | 200 | Died (cause: urosepsis) |
| Authors                  | Case Details                                                                 | US Findings                                                                 | Procedure                                                                 | Outcome          |
|-------------------------|------------------------------------------------------------------------------|----------------------------------------------------------------------------|---------------------------------------------------------------------------|------------------|
| Ogunyemi D.(2001)       | 27/G4P2 Fetal ureterocele                                                   | US: left ureterocele causing left hydronephrosis, dilation of the left ureter, and bladder outlet obstruction | -                                                                         | Assymetric renal function with residual functional dilatation |
| Windeel et al.(1995)    | 25/G1P0 Fetal renal anomaly (echogenic right kidney, multiple pelvic cyst)  | US: congenital imperforate hymen with hydrocolpos and a multiple dysplastic right kidney | Right multiple dysplastic kidney                                          | Observation      |
| Ozturk et al.(2010)     | 26/- 40 Fetal abdominal cyst mass                                           | US: bilateral hydronephrosis                                                | Polydactyly of both feet and hands Laryngoele                             | Hymenectomy 100  |
| Karteris et al.(2010)   | 32/G3P1 Fetal abdominal cyst mass                                           | US: pelvic mass, bilateral hydronephrosis                                   | -                                                                         | Improved         |
| El-Messidi et al.(2006) | 35/G1P0 Oligohydramnios                                                     | US: bilateral hydronephrosis compressed renal tissue pelvic mass            | McKusick-Kaufman syndrome Bilateral hydronephrosis Large cystic abdominal mass | Hymenectomy 100  |
| Posner et al.(2005)     | - 28 -                                                                      | US: pelvic mass                                                           | -                                                                         | Improved         |
| Krishna et al.(1998)    | - - -                                                                        | US: pelvic mass                                                           | -                                                                         | Hymenectomy 200  |
| Jacquemyn et al.(1998)  | 26/G1P0 Fetal disproportionate fundal height Suspicion of polyhydramnios    | US: fetal ascites distended uterus&vagina                                  | Single umbilical artery Atrial septal defect type 2                       | Hymenotomy 200   |

Abbreviations: US; Ultrasonography, G; Gravida, P; Para
| Author(year)         | Age (Median) | Patient's country | Total number | IH    | Combined abnormality                                      | Treatment                                                                 | Outcome |
|---------------------|--------------|-------------------|--------------|-------|-----------------------------------------------------------|---------------------------------------------------------------------------|---------|
| Zhang et al. (2017) | -            | China             | 3            |       | Congenital vaginal atresia:                               |                                                                           | Improved|
| Acar et al. (2007)  | 13.9±2.1 years | Turkey            | 65           | 65    | Haematocolpos (100% of all patients)                      | Central oval incision and Foley catheter inserted for balloon dilatation  | Improved|

Abbreviations: IH; Imperforate hymen
Supplementary Table S5. Combination of treatments for case-reported patients with imperforate hymen

| Treatment                                                                 | Total number of patients (n=236) |
|---------------------------------------------------------------------------|----------------------------------|
|                                                                          | Number of patients (%)           |
| **Single kind of therapy**                                               |                                  |
| Hymenotomy only                                                          | 73 (30.9%)                       |
| Hymenectomy only                                                         | 74 (31.4%)                       |
| Laparoscopic adhesiolysis only                                           | 2 (0.8%)                         |
| Vaginal orifice dilatation only                                          | 2 (0.8%)                         |
| Observation only                                                         | 2 (0.8%)                         |
| Laparotomy only                                                          | 1 (0.4%)                         |
| Vaginal septum repair only                                               | 1 (0.4%)                         |
| GnRH agonist only                                                        | 1 (0.4%)                         |
| Perforation and dilatation of hymen only                                 | 1 (0.4%)                         |
| Surgical incision of the imperforate hymen only                          | 1 (0.4%)                         |
| Unknown surgical correction only                                         | 1 (0.4%)                         |
| Trochar puncture suction only                                            | 1 (0.4%)                         |
| Abdominoperineal pull-through only                                       | 1 (0.4%)                         |
| **Two kinds of therapy**                                                 | 19 (8.1%)                        |
| Hymenectomy + Vaginal septum repair                                     | 3 (1.3%)                         |
| Hymenectomy + Laparotomy                                                 | 2 (0.8%)                         |
| Hymenectomy + Prophylactic antibiotics                                   | 2 (0.8%)                         |
| Hymenectomy + Vaginoplasty                                               | 1 (0.4%)                         |
| Hymenectomy + Repairing urethrovaginal fistula                           | 1 (0.4%)                         |
| Hymenectomy + Vaginal orifice dilatation                                 | 1 (0.4%)                         |
| Hymenotomy + Prophylactic antibiotics                                    | 4 (1.6%)                         |
| Hymenotomy + Anal cut back operation                                     | 1 (0.4%)                         |
| Hymenotomy + Laparotomy                                                  | 1 (0.4%)                         |
| Hymenotomy + Simple closure of fistula + Extraction of vaginal canal     | 1 (0.4%)                         |
| Hymenotomy + Excision of fistula                                         | 1 (0.4%)                         |
| Hymenotomy + Vaginal septum repair                                       | 1 (0.4%)                         |
| **Three kinds of therapy**                                               | 3 (1.3%)                         |
| Hymenectomy + Hymenotomy + Prophylactic antibiotics                      | 1 (0.4%)                         |
| Hymenectomy + Removal of calculi in pelvis + Irrigation of vaginal cavity| 1 (0.4%)                         |
| with antibiotic solution                                                 |                                  |
| Laparotomy + Puncture of the hymen + Bladder suturing                    | 1 (0.4%)                         |
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