Prioritization and management recommendations of pediatric urology conditions during the COVID-19 pandemic

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Introduction

The declaration of a worldwide pandemic related to the novel coronavirus (Sars-CoV-2) by the World Health Organization on March 11, 2020[1] has led to significant disruptions in the daily life of Canadians. In an attempt to minimize the spread of coronavirus disease 2019 (COVID-19), restrictions on public gatherings have been implemented. Widespread public adoption of social distancing regulations seems to have alleviated some of the burden on the healthcare system in what epidemiological experts have promoted as "flattening the curve."[2]

In an attempt to comply with legislated distancing measures, healthcare institutions have made dramatic changes to the care of patients during the pandemic, including the indefinite postponement of all non-essential clinic visits and elective surgeries. This significant and unprecedented change in practice has pushed healthcare providers to find creative and alternative strategies to ensure patients continue to receive the care they need while minimizing risk to both providers and patients and respect the distancing measures. The *Canadian Urological Association Journal* (*CUAJ*) has published a decision-making algorithm on how to prioritize elective urology surgeries in an attempt to standardize management, protect hospital resources, and, ultimately, mitigate the impact of COVID-19 on the outcomes of those we treat.[3]

Multiple studies across several medical specialties have shown that telehealth is feasible and safe, and can have positive impacts on healthcare resources, patient quality of life, and the environment.[4-7] Urologists have also explored the use of telemedicine for patients with ureteral colic and have shown promising outcomes, including an improvement in clinic capacity and financial benefits without sacrificing care.[8,9] Pediatric urology patients range from those with non-urgent concerns that affect the urogenital tract to those with life-threatening conditions. Children with serious urological concerns will need to be managed urgently despite the current pandemic, both in the clinic and the operating room. However, many of the less serious conditions may be amenable to virtual visits or telephone consultations.

Methods

In order to determine how Canadian pediatric urology patients are being managed during the COVID-19 pandemic, as well as to provide some guidance to providers, pediatric urology clinicians from across Canada were invited to provide expert recommendations on the clinical management of pertinent conditions. Participants were asked to complete a set of standardized questions related to a specific pediatric urological diagnosis (Table 1). Experts were also asked to stratify patients into four possible rebooking priorities based on urgency (Table 2). Table 3 summarizes the condition-related rebooking priority once the pandemic is resolved. The objective of the commentary is to provide a document

Table 1. Standard questions provided to manuscript authors

1	How has your triaging of this condition been adjusted given the COVID-19 pandemic? How do you anticipate triaging of this condition will be adjusted once pandemic restrictions are lifted?
2	Are there any initial investigations and management recommendations that could help you care for the patient?
3	Are there any red flag signs or symptoms that would prompt more immediate assessment and management of this patient?
4	Can this patient be adequately assessed via telehealth? If not, what rebooking priority would you assign this patient?
5	Do you have any recommendations regarding how to mitigate concerns to referring providers or parents/patients of delayed assessment and management of this condition?

that can be referenced by primary care providers, as well as general and pediatric urologists, in order to help standardize the care of pediatric urology patients during the pandemic and provide guidance on managing the surge of patients once restrictions begin to be lifted.

Hydronephrosis

(Authors: Mandy Rickard, NP; Dr. Michael Chua)

Background

Hydronephrosis (HN) is one of the most common congenital anomalies detected prenatally, affecting 1–5% of pregnancies.[10] Determining the etiology of HN requires further diagnostic investigations after birth.[10,11] Hence, pediatric urology providers may be asked to participate in prenatal counselling and management of patients with congenital anomalies of the kidneys and urinary tract (CAKUT). During the COVID-19 pandemic, while it may be possible to postpone the assessment of many urological conditions, pre- and postnatal CAKUT may require counselling, assessments, and investigations.

Conditions to screen for and red flag signs/symptoms

- Male infants with concern for posterior urethral valves (PUV)
- Bilateral hydroureteronephrosis (HUN) ± bladder abnormalities
- Solitary kidney with severe HN
- Dysplastic kidneys

Prenatal consultations

Antenatal anterior-posterior diameter (APD) >15 mm in the third trimester is associated with postnatal pathology,[12] and CUA guidelines on the management of antenatal HN recommend referral to a specialized center for APD >7 mm.[13] Prenatal consultations are amenable to virtual visits, as review of imaging can be carried out remotely and consultations can be completed via video/teleconferencing. Diagnostic findings can be reviewed with the expectant parents, as well as discussions on the postnatal recommendations, including additional investigations (followup ultrasound [US], voiding cystourethrogram [VCUG], and indications for continuous antibiotic prophylaxis [CAP]).[13,14]

Table 2. Recommendations for rebooking priority for patients amenable to delayed clinical visits after virtual visit confirms no significant change in status

Rebooking priority	Recommendation
Priority 1	Urgent: Rebook as soon as possible
Priority 2	Semi-urgent: Safe to postpone clinic visit up to 3 months
Priority 3	Non-urgent: Safe to postpone clinic visit up to 6 months
Priority 4	Elective: Safe to postpone clinic visit beyond 6 months

Postnatal CAKUT triage recommendations

Urgent, in-person clinic assessment

- Severe HN (Society for Fetal Urology [SFU] grade 3–4, APD >15 mm)
- Bilateral HN
- HN in a solitary kidney
- Suspected PUV
- Duplex system with HUN, including suspected ureteroceles
- Postoperative visits requiring procedures (i.e., stent removals)
- Postoperative complications (infections; pain)
- Complex patients with a change in status (e.g., PUV patient with decreased urine output)

Postponed in-person clinic assessment

- Infants with mild HN (SFU grade 1–2, APD 7–10 mm)
- Moderate unilateral HN (SFU grade 3)
- Vesicoureteral reflux (VUR) on CAP
- Duplication anomalies, voiding well, and infection-free with CAP
- Followup visits with stable dilatation and no urinary tract infections (UTIs)
- Postoperative patients who are progressing well at home

For patients with US findings that are suggestive of a condition associated with a higher risk of infections (i.e., high-grade HN, hydroureter), CAP should be considered until appropriate imaging and in-person assessment can take place.

Table 3. Post-pandemic rebooking priorities for patients with deferred clinic visits

	Rebooking priority			
	1	2	3	4
AHN	Postoperative followups New HN referrals Previous moderate HN New infants with UTIs	Stable HN Known VUR patients on CAP Stable PUV	Postoperative patients with stable US Older PUV patients with no immediate concerns	
Acute upper tract obstructions	Patients most likely to require an intervention: – Recurrent Dietl's crisis – Stones not responding to medical therapy or causing recurrent infections	History of Dietl's crisis but are not experiencing repeated episodes Postoperative patients who have not had a followup visit Stable stones	Postoperative patients with at least one previous visit	Routine surveillance with stable imaging
Penile pathology	Pathologic phimosis Non-cosmetic-related hypospadias complications	Routine postoperative followups	New hypospadias consultations Hypospadias who have undergone the first stage of a staged repair	All other penile issues cosmesis-related hypospadias concerns
VUR and recurrent UTI	New referrals for newborns/infants in need of imaging Breakthrough UTIs Postoperative visits	Routine followups with imaging Infants/non-toilet-trained children on CAP with no UTIs	Post CAP DC with no UTI + previously normal/stable ultrasound Older children on CAP with no UTIs	Older children with concurrent BBD with no UTIs
Inguinal pathology	Symptomatic inguinal hernias	New patients with suspected inguinal hernias Children >24 months with hydroceles	New referrals for boys <24 months with hydroceles	New referrals for boys <12 months with hydroceles
BBD	Abnormal upper tracts on ultrasound Breakthrough febrile UTIs Abnormal renal function Persistently high PVR	≥6 months unsuccessful bladder retraining Associated VUR with CAP Refractory patients on medication or alternative therapies	Already have had at least one consultation and are progressing well	Stable patients with annual visits and are close to discharge to primary care
DSD	New suspicion of DSD later in childhood whose visit was virtual and a physical examination was not completed New DSD diagnosis that for some reason was not seen by the pediatric urology team at birth in the hospital Postoperative followups	Patients with a delayed surgical intervention	Stable DSD patients whose visits were deferred	
Neurogenic bladder	HN/HUN; febrile UTIs; asymptomatic kidney and bladder stones; solitary kidneys; HN/HUN Difficulty catheterizing channel/stomal stenosis Infants (<12 months) for surveillance of bladder function/upper tracts Gradual changes to voiding patterns Postoperative visits for recent reconstructions	Children 12–24 months with bladder emptying regimens VUR and taking CAP Older children with bladder emptying regimens; previously normal upper tracts	Older children with bladder emptying regimens; previously normal upper tracts	Routine surveillance with stable imaging
Testicular and fertility concerns	Bilateral UDT Non-palpable testes Symptomatic varicoceles >24 months with UDT UDT associated with hernias	12–24 months with UDT Asymptomatic varicoceles Postoperative followups	6–12 months with UDT	<6 months of age with palpable UDT; retractile testes

AHN: antenatal hydronephrosis; BBD: bladder and bowel dysfunction; CAP: continuous antibiotic prophylaxis; DSD: disorder of sexual differentiation; HN: hydronephrosis; HUN: hydroureteronephrosis; PUV: posterior urethral valves; US: ultrasound; UTI: urinary tract infection; VUR: vesicoureteral reflux.

Table 3 (cont'd). Post-pandemic rebooking priorities for patients with deferred clinic visits

	Rebooking priority			
	1	2	3	4
Bladder/ cloacal exstrophy	Postoperative followups Febrile UTIs Stable HN/HUN	Infants with a recent repair under routine surveillance Uncomplicated UTIs	Continence issues	Older patients with routine surveillance

AHN: antenatal hydronephrosis; BBD: bladder and bowel dysfunction; CAP: continuous antibiotic prophylaxis; DSD: disorder of sexual differentiation; HN: hydronephrosis; HUN: hydroureteronephrosis; PUV: posterior urethral valves; US: ultrasound; UTI: urinary tract infection; VUR: vesicoureteral reflux.

Virtual visit/telephone encounter (pre- and postnatal CAKUT)

A careful history taken from the family and the prenatal care team is critical. Information regarding the prior antenatal diagnostic findings, family medical history, and background are important pieces of information during counselling. Discussion of the diagnostic findings and management plan depends on the spectrum of CAKUT, prognosis, and families' cultural background. However, it is important to clarify the risk-benefit of each option, such as continuous monitoring (with/without diagnostics), consideration of circumcision for parents of newborn males (as this can be completed prior to discharge), as well as CAP when indicated.

Investigations to be obtained prior to assessment

Prenatal parental counselling: Antenatal US(s) for review, including information on essential measurements, such as APD, amniotic fluid index, laterality, presence of bladder abnormalities and suspected anomalies to determine the severity and etiology of HN.

Postnatal: US for assessment of HN severity. This is particularly important for newborn males with bilateral HN to document indicators of PUV (bilateral hydroureter, bladder abnormalities, dilated posterior urethra). The necessity of VCUG should be determined by a pediatric urology provider upon review of initial ultrasounds. Infants with signs of dysplastic kidneys, solitary kidney with HN, or with increased renal echogenicity should also be investigated with baseline laboratory investigations (electrolytes and kidney function tests) prior to the initial consultation followed by a referral to pediatric nephrology.

Management

Postnatally, communication between the obstetrics provider and the pediatric urology team is important, particularly for newborns with findings that meet the criteria for urgent visits (see above). Requests for followup imaging, placement of a catheter, and/or CAP may need to be discussed prior to discharge from the hospital.

Acute upper urinary tract obstruction

(Author: Dr. Peter Metcalfe)

Background

Patients with HN may be categorized into symptomatic and asymptomatic, with the understanding that the presence of symptoms refers to the probability of acute obstruction. The most common etiologies of acute upper tract obstructions in children and adolescents are calculi and ureteropelvic junction obstructions (UPJO). Patients may present to the emergency department (ED) with severe flank pain and/or vomiting due acute UPJO in a syndrome known as Dietl's crisis. Due to limited access to radiology during the COVID-19 pandemic, most routine followup imaging is not possible and alternative assessments must be conducted. However, postponement of every case may not be feasible. Ultimately, with respect to management of symptomatic urinary tract obstruction, as a semi-urgent to urgent illness, acute treatment should not differ due to pandemic restrictions.

Conditions to screen for and red flag signs/symptoms

- Obstructive stones with symptoms (infection, pain, elevated kidney function markers)
- Symptomatic UPJO (flank pain, vomiting, without spontaneous improvement, infection)
- Evidence of obstruction in a solitary kidney

Triage recommendations

Urgent, in-person clinic assessment

- Pyelonephritis/sepsis in an obstructed system
- Pain, nausea, and/or vomiting not resolving with optimal medical management
- Traumatic rupture of a hydronephrotic kidney
- Obstructive calculi that may benefit from intervention for relief of symptoms and to prevent further visits to the ED
- Postoperative patients requiring a procedure such as stent removal

Postponed in-person clinic assessment

- Well children with no UTI or further episodes of Dietl's crisis
- Response to medical management (pain management for intermittent flank pain, expulsion therapy for calculi)
- Postoperative children who are progressing well without change in symptoms
- Known non-obstructing stones that remain asymptomatic

Virtual visit/telephone encounter

Due to the imaging requirements of this population, an in-depth clinical assessment via virtual visit is not possible unless diagnostics can be obtained. In certain circumstances, an US may be completed, and a phone call organized to discuss the results; this option should be explored for any children who would otherwise have a postponed in-person visit. A detailed history and review of the presence and duration of symptoms, as well as UTIs, passing of stone fragments, and pain episodes will help prioritize the urgency of clinic visits.

Investigations to be obtained prior to assessment

For new urgent consultation requests/referrals, a baseline US to assess the severity of HN or stone burden is essential. In addition, laboratory investigations, such as renal function markers, electrolytes, and initial stone metabolic workup, may also be indicated.

Management

When possible, medical management should be optimized, including adequate hydration and pain management. For stones that may pass spontaneously (i.e., <5 mm, distal ureteral location) alpha-blocker therapy may be considered to facilitate this. Families should be advised to collect any stones expelled. For those that meet criteria for urgent intervention, stent placement, nephrostomy tube insertion, or pyeloplasty should be considered on a case-by-case basis.

Recurrent UTIs and VUR

(Authors: Dr. Peter Wang; Dr. Sumit Dave)

Background

VUR has a prevalence in the general population of 0.4–1.8%, which increases to 30–50% in children with UTI.[15,16] Treatment is aimed at reducing the potential morbidities of recurrent UTI and renal scarring.[17,18] During COVID-19, when possible, the indications for obtaining imaging of VUR patients may follow the guidelines from the U.K.'s National Institute for Health and Care Excellence (NICE). NICE recommends an US within six weeks after an initial febrile UTI for children ≤6 months of age, and US within six weeks for the second febrile UTI in children >6 months of age. The urgency of performing a VCUG after UTI is multifactorial, however, it can often be safely delayed by keeping the child on CAP.

Conditions to screen for and red flag signs/symptoms

Secondary causes of VUR (such as neurogenic bladder and PUV, which may be suspected if there is US evidence of HN, HUN, bladder abnormalities, or high post-void residuals [PVR]).

Triage recommendations

Urgent, in-person clinic assessment

- Suspicion of VUR being due to one of the red flags mentioned above
- If VUR is associated with severe HN or HUN and a secondary obstruction is suspected
- Postoperative patients with potential complications

Postponed in-person clinic assessment

- New referrals requiring imaging
- Recurrent UTIs
- Stable postoperative followup
- Routine surveillance with US

Most children with VUR can be safely postponed for in-person visits if CAP has been appropriately initiated. If breakthrough UTIs occur, a change of CAP via virtual visit may be considered.

Virtual visit/telephone encounter

This condition is amenable to normal triaging practices, as virtual visits may be used for both an initial consultation and followup. It is especially useful if imaging has been performed and available for review prior to the visit. During the initial consultation, it is important to determine whether VUR is primary vs. secondary. For primary VUR, age, sex, circumcision status, CAP use, number and severity of UTIs, whether they were febrile, and whether VUR was diagnosed during the workup of HN or after UTI should be determined. For secondary VUR, in addition to these patient variables, the presence of bladder and bowel dysfunction (BBD) is an important factor to elicit.

Investigations to be obtained prior to assessment

Documentation of UTIs, including urinalysis and cultures, which may guide CAP selection, as well as associated imaging (US and VCUG).

Management

CAP is the initial treatment option for most patients, and several risk stratification variables guide its usage.[19] It may be a safe option while pandemic restrictions are in place and clinic assessments not possible. Breakthrough UTIs may be initially managed by changing the CAP.

Urgent or life-threatening conditions: End-stage renal disease and genitourinary neoplasms

(Authors: Dr. Armando Lorenzo; Dr. Daniel Keefe)

Background

The management of end-stage renal disease (ESRD) from a urological perspective involves the placement and maintenance of peritoneal dialysis (PD) catheters, pre-renal transplant assessment and counselling, and the transplant procedure itself.[20] Many centers have placed renal transplantation on hold during the pandemic, making pre-transplant urological assessments less urgent than prior to COVID-19. However, PD catheter insertion or maintenance may qualify for urgent consultation to minimize the risk of requiring emergency placement of hemodialysis catheters. Home PD, for those capable, would undoubtedly reduce the frequency of hospital visits compared to clinic-based hemodialysis.[21] Neoplasms of the genitourinary tract, while uncommon in children, will require urgent assessment despite the significant limitations of in-person visits during the pandemic.[22]

Conditions to screen for and red flag signs/symptoms

- Patients with severe hypertension on multiple medications or massive proteinuria may require pre-transplant nephrectomies; these can be selectively performed on an urgent basis
- Palpable masses or suspicious lesions on imaging should trigger a phone consultation with the on-call urologist for further instructions and suggestions

Triage recommendations

Urgent, in-person clinic assessment

- Palpable masses or suspicious lesions on imaging
- High-risk patients, who may experience significant morbidity if transplantation is delayed, should complete pre-transplant workup in anticipation of a transplant once restrictions are lifted
- ESRD patients may be in the hospital for other visits or dialysis, making an in-person visit possible

Postponed in-person clinic assessment

- Stable ESRD patients who require imaging for pre-transplant assessment and/or physical examination
- Postoperative patients who are stable with no concerns (i.e., orchiectomy, partial orchiectomy, nephrectomy with at least one stable followup)

Virtual visit/telephone encounter

Virtual visits for pre-transplant assessments are feasible if all the diagnostics, such as laboratory investigations and diagnostic imaging, have been completed. The virtual visit can allow appropriate pre-transplant history, however, the physical exam should be completed in person preoperatively. Neoplasms require in-person assessments, however, discussion of results of diagnostics, such as imaging and pathology, may be suitable for virtual consults.

Investigations to be obtained prior to assessment

In ESRD and pre-transplant evaluations, standard laboratory investigations should be available for review from the nephrology/transplant team. In addition, a renal US with doppler to assess vascular patency is required prior to the visit. Patients with CAKUT may benefit from a VCUG. If referring providers suspect a malignancy, baseline laboratory investigations should be initiated (basic hematology, chemistry, and relevant tumor markers), as well as appropriate imaging (US). Obtaining these investigations should not delay the referral.

Management

ESRD management will be dictated by the urgency of requiring dialysis. PD is preferred over hemodialysis in most cases to facilitate home PD. Renal transplantation will be deferred until restrictions are lifted, however, pre-transplant evaluations should continue to expedite transplantation in the future. Children with neoplasms will require additional imaging, as well as assessment by the oncology team.

Management will be dictated by the specific malignancy, stage, and grade. Multidisciplinary oncology discussion via teleconferencing can help determine appropriate management based on available investigations and pathology.

Penile pathology (hypospadias/phimosis/paraphimosis)

(Authors: Dr. Mélise Keays; Dr. Luis Guerra)

Background

Hypospadias is a common penile birth defect occurring in one in 200 live male births. The majority of cases will undergo elective surgical correction at 6–18 months of age.[23] Physiological phimosis represents a normal finding at birth,[22] with retractability increasing progressively with age.[23] Pathological phimosis may occur due to lichen sclerosis, symptoms (recurrent balanoposthitis, skin-cracking, forceful retraction) or failure to retract after puberty. Paraphimosis occurs when the foreskin is retracted proximal to (or behind) the glans and cannot be reduced.

Conditions to screen for and red flag signs/symptoms

- Disorder of sexual differentiation (DSD)
- Proximal hypospadias with associated cryptorchidism in a newborn
- Obstructive urinary symptoms/UTI
- Paraphimosis
- Balanoposthitis
- Obstructive urinary symptoms
- New-onset urinary incontinence
- Presence of hair tourniquet on the penis
- Urinary retention

Triage recommendations

Urgent, in-person clinic assessment

- Newborns with possible DSD with associated cryptorchidism who require a physical exam, metabolic, endocrine, and genetic evaluation, as well as abdominal US
- Uncorrected hypospadias or postoperative cases with obstructive urinary symptoms (urinary retention or UTI) or foreskin/scrotal cellulitis
- Postoperative patients requiring an in-clinic procedure, such as a stent/dressing removal
- Pathological phimosis with retention or infection
- Paraphimosis medical emergency

Postponed in-person clinic assessment

- New hypospadias consultations and elective surgical repairs
- Routine postoperative followups
- Physiologic phimosis may not require urological consultation and early management should be deferred to the primary care provider
- Suspected pathological phimosis with no voiding concerns or mildly symptomatic cases

Virtual visit/telephone encounter

Many patients with penile concerns will require a physical exam to make any recommendations for surgical correction or identify postoperative complications. In all cases, a virtual assessment can help identify patients in need of more urgent care. A thorough history, including voiding patterns, history of prior prepuce retraction, episodes of balanitis or UTI, prior treatments with topical corticosteroids, medical history, and family history can be elicited. In some circumstances, video consultation or genital photography through a secure server can be used with patient and family consent. The use of this technology should be guided by the comfort level of patients and parents, and consent obtained from the child if they are old enough to do so. However, there may be video or photo quality issues that impair the ability to make a correct diagnosis and it is the authors' opinion that an in-person physical exam should be performed prior to making surgical recommendations.

Investigations to be obtained prior to assessment

Secure photographs of hypospadias/penile concerns after documentation of patient consent for virtual visits. No investigations required for isolated hypospadias.

Management

Most hypospadias consultations and primary repairs will be deferred until pandemic precautions have been lifted. Primary care providers or obstetricians diagnosing hypospadias in otherwise healthy boys with a normal testicular exam can reassure parents after spontaneous voiding is witnessed that the isolated condition does not require urgent assessment. Asymptomatic, physiological phimosis is considered normal and does not require medical treatment or specialist consultation.[24] Patients with bothersome symptoms or evidence of early lichen sclerosus should begin medical therapy with topical corticosteroid. Simple balanitis can be managed at home with avoidance of irritants, regular baths, and topical antibiotic ointment. More advanced cases will require oral antibiotics.

Inguinal pathology (hernia and hydrocele)

(Authors: Dr. Linda Lee; Dr. Allen Hayashi)

Background

Pediatric inguinal hernias and hydroceles form due to a patent processus vaginalis (PPV). The incidence of an inguinal hernia is 0.8–5% in full-term infants, with a higher incidence in premature infants.[24] The overall risk of incarceration is 6–18% among children and the risk is highest, up to 30%, in the first year of life.[25] The goal of surgical management is to reduce the risk of incarceration and alleviate symptoms.

Conditions to screen for and red flag signs/symptoms

- Signs of incarceration (irreducible swelling, inconsolable child, nausea, vomiting, abdominal distension, erythema over the groin and scrotal skin)
- Scrotal swelling, including signs of vascular compromise to the testicle from incarcerated hernia compression or testicular torsion

Triage recommendations

Urgent, in-person clinic assessment

- Inguinal hernias with signs of incarceration
- Recently manually reduced incarcerated inguinal hernias due to 15% chance of developing recurrent incarceration if delayed >5 days[26]
- Premature infants/newborns with inguinal hernias
- Postoperative patients with complications

Postponed in-person clinic assessment

- Older patients with inguinal hernias
- Isolated asymptomatic hydroceles

Virtual visit/telephone encounter

The clinical history is important, as the ability to examine the child is lost, and should include the duration of symptoms, history of painful episodes, presence of palpable bulge, and fluctuation in swelling. If possible, observing the cooperative child in the standing position with the parents identifying where they may have seen a hernia or hydrocele is often very useful. Parents can be educated regarding "red flags" and may be able to check for reducibility of the hernia and transillumination.

Investigations to be obtained prior to assessment

The diagnosis is based on clinical history and physical examination. If the clinical examination is equivocal or other diagnoses are being considered (e.g., inguinal or scrotal mass), US is a useful adjunct.

Management

Surgical intervention is the required management for inguinal pathologies. Emergent cases, such as incarcerated hernias, will proceed as they did prior to the pandemic. All other cases should be prioritized according to symptoms

Bladder and bowel dysfunction

(Author: Dr. Joana dos Santos)

Background

BBD represents approximately 40% of pediatric urology consults[27,28] and is a functional elimination disorder that describes an umbrella of lower urinary tract symptoms associated with constipation and/or encopresis. Much of the primary management of BBD can be accomplished by community providers. Due to the non-surgical and non-urgent nature of BBD, it is the pediatric urological condition most amenable to virtual visits and these visit types may be considered beyond the pandemic in an attempt to minimize clinic volumes and congestion.

Conditions to screen for and red flag signs/symptoms

- Central neurological causes of BBD (new-onset seizures, developmental delay, regression of milestones)
- Neuropathic bladder due to spinal cord abnormalities (including associated lower limb abnormalities, abnormal lower back exam)
- Endocrine/renal (headache, polyuria/polydipsia, hypertension)
- Urinary retention

Triage recommendations

Urgent, in-person clinic assessment

- If there is any suspicion of the red flags mentioned above

Postponed in-person clinic assessment

- ≥2 febrile UTI with positive urine cultures (catheter sample in non-toilet-trained or midstream in toilet-trained children)

- Evidence of ≥6 months of unsuccessful bladder retraining
- Abnormal US (HN, renal scarring, cortical thinning)
- Stable renal function

Virtual visit/telephone encounter

For the vast majority of children and adolescents with BBD, virtual consults represent a great opportunity to expedite a thorough assessment and initiate treatment, while practicing social distancing. For new BBD referrals with confirmed febrile UTIs and/or abnormal upper tracts, CAP should be considered until a specialized assessment has been secured. The initial assessment must include a full history: voiding symptoms; bowel history; febrile UTIs; toilet-training process; known urinary tract malformations; potential red flags. Social support, issues at home and developmental/behavioral issues with the child should be elicited. Refractory/complex BBD patients on medication and/or alternative therapies are candidates for virtual consults, as investigations have already been completed and adjustments to therapies can be made remotely.

Investigations to be obtained prior to assessment

A 48-hour voiding diary (voided volumes, accidents, bowel movements, fluid intake), dysfunctional voiding scoring system (DVSS or Vancouver) and Bristol Stool Scale should be completed at baseline and followups. Urinalysis, urine cultures, and relevant lab and imaging results should be reviewed.

Management

Urotherapy should be initiated,[27,29-31] the bladder training video[32] reviewed, and children with recurrent febrile UTIs may be started on CAP.[33] Additional interventions for those who have failed conservative management, such as medications, may be considered.[34]

Ambiguous genitalia and differences in sexual differentiation

(Authors: Natasha Brownrigg, NP; Dr. Luis Braga)

Background

Any type of genital ambiguity in a newborn can provoke major psychological distress for parents[35] and calls for prompt multidisciplinary evaluation and care.[36,37] The umbrella term, DSD, is used to describe a heterogeneous group of congenital anomalies affecting the development of chromosomal, gonadal, or anatomical sex.[36,37] DSD has an incidence of one in 4500–5000 live births.[36] This umbrella term was proposed by the Chicago consensus statement in 2006, but since that time, there has been a lack of agreement in its use. Some patients and families still prefer terms like intersex, while others prefer DSD, but most prefer to be identified by their individual condition. Placing everyone under a single umbrella term is risky and because it is so broad, it does not assist in clinical care. This is particularly true for 46,XX females with CAH and 46,XY males with hypospadias, where discordant gender identity is rarely an issue. During the COVID-19 pandemic, as with any other medical specialty, certain aspects of DSD care may have to be postponed to adapt to this new reality. However, the assessment of DSD in newly referred patients should not be delayed.

Conditions to screen for and red flag signs/symptoms

- Evidence of salt-wasting congenital adrenal hyperplasia (CAH)
- Enlarged clitoris, posterior labial adhesions, inguinal/labial mass in genitalia appearing female[37]
- Bilateral undescended testes, micropenis, isolated perineal hypospadias, or hypospadias with undescended testis in genitalia appearing male[37]
- Obvious genital ambiguity (i.e., cloacal exstrophy)[37]
- Discordance between prenatal karyotype and phenotype[37]

Triage recommendations

Urgent in-person clinic assessment

- New suspicion of DSD in a newborn or infant. The primary goal is to identify life-threatening conditions requiring immediate medical care (i.e., salt-wasting CAH with a risk of hypovolemic shock); gender assignment should only be made after a thorough evaluation by the multidisciplinary team[36,37]
- Postoperative patients reporting complications

Postponed in-person clinic assessment

- Stable patients being routinely followed with a confirmed DSD diagnosis and plan of care

Virtual visit/telephone encounter

For children with a suspicion of DSD later in childhood (previously unrecognized ambiguous genitalia, inguinal hernia in a female, delayed or incomplete puberty, virilization in a female, primary amenorrhoea, breast development in males, or gross cyclic hematuria in males[37]), a virtual encounter permits the provider to obtain a detailed history and arrange additional investigations and/or referrals to other subspecial-

ties. Prenatal consultations for suspected DSD can be carried out after a review of appropriate testing and imaging. Patients whose surgery is delayed may be appropriate for a virtual visit for surgical counselling and planning, keeping in mind that the timing of surgery is controversial.[37,38] In addition, even though the risk of malignancy is higher in cases of streak gonads, this risk is insignificant before puberty, therefore, gonadectomy may be postponed until the pandemic is over.

Investigations to be obtained prior to assessment

Karyotype; abdominal and pelvic US; biopsies of gonadal tissue; genetic testing; laboratory investigations, including serum 17-hydroxyprogesterone; testosterone; gonadotropins (i.e., follicle-stimulating hormone [FSH], luteinizing hormone [LH]); anti-Mullerian hormone; serum electrolytes; urinalysis; human chorionic gonadotropin (hCG) and adrenocorticotropic hormone (ACTH) stimulation tests; urinary steroid analysis.[37]

Management

A multidisciplinary approach should be taken with all children receiving a gender assignment. Surgeons must outline surgical plans and discuss potential complications related to having early surgery or postponing the procedure. In cases of severe virilization (Prader III, IV, and V), surgery may be offered based on recommendations from the 2006 consensus statement. Functional outcome is the primary focus and psychosocial care should be offered.[37]

Neurogenic lower urinary tract dysfunction

(Authors: Dr. Soojin Kim; Dr. Andrew MacNeily)

Background

The International Children's Continence Society (ICCS) endorses the definition of lower urinary tract dysfunction (LUTD) as an abnormal or difficult function of the bladder and urethra.[39,40] Specifically for neurogenic LUTD, the dysfunction may be due to spinal cord injury, spinal dysraphism, brain or spinal tumor, cerebral palsy, transverse myelitis, iatrogenic insult, and non-neurogenic neurogenic causes.[41] During the COVID-19 pandemic, patients with neurogenic LUTD and their caregivers may have many questions and concerns, however, the Spinal Bifida Association reported that, in general, individuals with spinal dysraphism are not at increased risk of contracting COVID-19 or suffering severe illness from the virus.[42]

Conditions to screen for and red flag signs/symptoms

- Atypical BBD presentation (new onset of retention, encopresis, and/or lower limb abnormalities)
- Known patients with changes in voiding patterns, encopresis, and/or lower limb changes
- Changes to upper tracts on US (HN, HUN), bladder abnormalities
- Febrile UTIs

Triage recommendations

Urgent, in-person clinic assessment

- Newborns with spinal dysraphism
- Sudden onset of changes to voiding, either retention or incontinence
- Postoperative complications
- Symptomatic kidney/bladder stones

Postponed in-person clinic assessment

- Established bladder emptying regimen
- Properly treated UTIs
- Routine surveillance
- Stable postoperative patients

Virtual visit/telephone encounter

While this population typically has imaging associated with their visits, virtual followups can be used to ensure there are no changes to status since the last visit. Changes to clean intermittent catheterization (CIC) schedules, starting or discontinuing medications, and recommending CAP can all be completed virtually. For new patients with neurogenic LUTD, an initial virtual consult can help to identify voiding patterns, bowel patterns, and symptoms, such as UTIs and episodes of retention.

Investigations to be obtained prior to assessment

Renal US and baseline renal function laboratory studies may be carried out prior to assessment. A voiding and bowel diary, including catheter volumes, may help estimate bladder capacity, determine ideal frequency of CICs, and optimize bowel regimen. Other potential investigations, such as nuclear scans, VCUGs, and urodynamics (UDS), should be indicated by urology clinicians and can usually be done on a non-urgent basis.[43,44]

Management

Establishment of effective bladder drainage is the initial main priority to protect upper tract functional compromise. This is generally accomplished with CIC, as well as initiation of appropriate medications, including anticholinergics. Patients with recurrent UTIs may benefit from CAP until more detailed assessment or bladder management is optimized.

Concerns regarding future fertility (including undescended testicles, varicoceles)

(Authors: Dr. Anne-Sophie Blais; Dr. Katherine Moore; Dr. Stéphane Bolduc)

Background

Undescended testicles (UDT) and varicoceles are common testicular conditions encountered in the pediatric urology clinic. The risks of short-term delay in the management of these conditions are minimal but prolonging delayed investigation or treatment may lead to worrisome consequences, including infertility, hypogonadism, and concern for increased risk of malignancy. Severe germ cell loss has been identified in testicles that remain undescended by the age of two years.[45] Histological effects of varicoceles are still not well-understood in adolescents, but there is adult literature showing altered testicular growth and decreased spermatogenesis affecting fertility potential.[46,47] Delayed diagnosis and treatment of these conditions as a result of pandemic restrictions may lead to parental concern.

Conditions to screen for and red flag signs/symptoms

- UDT: Bilateral non-palpable especially if associated with hypospadias; these may represent CAH/DSD
- Varicocele: Acute onset, isolated right-sided, non-reducible in the recumbent position; these may be secondary to compressive retroperitoneal/abdominal masses
- Suspected torsion (usually via the ED)

Triage recommendations

Urgent, in-person clinic assessment

- Newborns with bilateral UDT
- UDT associated with penile anomalies
- Right-sided varicoceles
- Varicoceles in prepubescent children
- Neonatal torsion

Postponed in-person clinic assessment

- New referrals for UDTs and left-sided varicoceles
- Postoperative patients without concerns

Virtual visit/telephone encounter

An essential component of the assessment of children with UDT and varicoceles is the physical examination.[48] Consultation should be postponed for an in-person clinic assessment. However, virtual/telephone encounters can help the clinician to distinguish retractile from UDT (which may change rebooking priority) and to identify patients who may need further investigations before assessment. A patient (or parent) self-exam may help to document testicular position, testicular volume discrepancy, grade of varicocele, and integrity of the contralateral testicle. For centers offering fertility preservation for oncology patients, counselling and surgical discussion can be carried out with virtual visits.

Investigations to be obtained prior to assessment

For bilateral non-palpable testes (NPT) and patients with UDT and proximal hypospadias, a genetic and endocrine evaluation should be considered.[48] Moreover, newborns with bilateral NPT should undergo an endocrine evaluation to rule out CAH. An abdominal US should be obtained for prepubescent varicoceles, right-sided varicoceles, and/or varicoceles that do not fluctuate with Valsalva. US assessment for UDT in the absence of any red flags is not indicated.

Management

Management of these issues is surgical, and the scheduling of procedures will depend on surgical volumes and backlog once restrictions are lifted.

Bladder and cloacal exstrophy

(Authors: Dr. Landan MacDonald; Dr. Dawn MacLellan; Dr. Peter Anderson; Dr. Rodrigo Romao)

Background

A trend to delay the repair of classic bladder exstrophy by a few months after birth, as opposed to the traditional approach of repairing it in the neonatal period, has been described in the pre-pandemic era in high-volume centers[49] and is aligned with the recently published European Association of Urology (EAU) COVID-19 guideline.[22] For cloacal exstrophy patients, management will be determined on a case-by-case basis. The presence of associated anomalies, such as myelomenin-

gocele, and gastrointestinal tract status will dictate the need for an urgent intervention in the neonatal period.

Conditions to screen for and red flag signs/symptoms

- Symptomatic bladder stones
- Febrile UTIs
- Renal function compromise due to obstruction (post-repair)

Triage recommendations

Urgent, in-person clinic assessment

- Newborns with bladder/cloacal exstrophy
- Postoperative complications
- Suspicion of bladder stones

Postponed in-person clinic assessment

- Routine followups
- UTIs
- Management of continence issues
- Fertility discussion

Virtual visit/telephone encounter

Routine surveillance can be completed via virtual visits; management of continence issues and discussion surrounding fertility concerns are also ideal for virtual consults. Surgical counselling may also be completed via virtual visit, as well as changes to current continence medications and regimens.

Investigations to be obtained prior to assessment

US of kidneys prior to initial assessment; documentation of any UTIs

Management

If the neonate is stable, there is no need to transfer to a specialized center until mother can also be discharged. Communication between the neonatal care unit and pediatric urology team is needed to counsel parents and provide instructions on care of the bladder plate, including coverage with a Tegaderm® or plastic wrap, silk tie on umbilical cord, and avoidance of prophylactic antibiotics prior to bladder closure to avoid antimicrobial resistance.

Recommendations for minimizing clinic congestion after the COVID-19 pandemic through optimization of telemedicine

Canada was an early pioneer in the realm of remote provision of care, with Dr. Maxwell House delivering telemedicine care to remote regions in Newfoundland dating back to the 1970s. Our vast geography is a great impetus to continue to expand this domain of healthcare delivery.

The COVID-19 pandemic has provided unprecedented opportunity for clinicians to implement strategies to reduce clinic volumes. This endeavor has led to a substantial increase in telemedicine and virtual visits. Expert opinion from across the country favors expanding the use of telemedicine in clinics, as highlighted in this document, even once the current pandemic resolves. The panel would suggest that patients ideal for telemedicine would be those where the patient and family have the means and motivation to be assessed in this fashion, an available local physician or healthcare provider that can be engaged as a partner, and accessibility to obtain imaging outside of the hospital environment that can be reviewed and interpreted by the pediatric urology clinician during the visit if required. Although beyond the scope of this commentary, we would direct healthcare providers participating in telemedicine to the guidelines outlined by the Canadian Medical Association and the American Telemedicine Association.[50,51]

Conditions that can be managed almost exclusively with virtual visits as long as the above conditions are met include:

- BBD
- Prenatal CAKUT parental counselling
- Stable, mild, and moderate HN
- VUR with no UTIs and stable imaging
- Neurogenic LUTD with stable imaging, established bladder and bowel routines, and no infections
- Selective postoperative patients without complication concerns (circumcisions, inguinal hernias, orchidopexy)

Conclusions

The COVID-19 pandemic has caused a drastic change in our ability to provide care for pediatric urology patients. Urgent/emergent life- and limb-threatening conditions continue to require immediate urological assessment. However, many pediatric urology conditions are amenable to delayed in-person assessment or virtual encounters. As we move through this pandemic and once restrictions are lifted, we will be responsible for appropriately triaging the backlog of patients. In the future, there may be similar unforeseen circumstances and these guidelines can help as a basis for management. This document, created by experts in pediatric urology in

Canada, is aimed to guide stratification of patients according to urgency and suggest appropriate investigations to initiate while awaiting specialist assessment.

Competing interests: Dr. Bolduc has been a principal investigator for clinical trials supported by Astellas and Pfizer. Dr. Moore has been an advisory board member for Pfizer; has received speaker honoraria for Duchesnay and Hollister; and has been an investigator for clinical trials supported by Astellas and Pfizer. The remaining authors reports no competing personal or financial interests related to this work.

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