Prolapsed Rectum and Risk Factors in Prader–Willi Syndrome: A Case-Based Review

Merlin G. Butler[1]

[1] Department of Psychiatry and Behavioral Sciences, University of Kansas Medical Center, Kansas City, Kansas, United States

J Pediatr Genet

Address for correspondence Merlin G. Butler, MD, PhD, Department of Psychiatry and Behavioral Sciences, University of Kansas Medical Center, 3901 Rainbow Blvd., MS 4015, Kansas City, KS 66160, United States (e-mail: mbutler4@kumc.edu).

Abstract

A 14-year-old boy with Prader–Willi syndrome (PWS) with maternal disomy 15 is reported with rectal prolapse as only the second patient in the literature. With predisposing risk factors present for rectal damage and prolapse in this syndrome, the incidence must be higher and therefore underreported. These risk factors include skin and rectal picking, self-stimulation, altered pain sensation, decreased muscle mass, strength and physical activity with hypotonia, and gastrointestinal (GI) disturbances. Pertinent literature was reviewed and analyzed that focused on clinical features and behavior seen in PWS as underrecognized risk factors for developing rectal damage and prolapse. An illustrative case is presented as the second patient reported with PWS and a prolapsed rectum. A discussion of predisposing behavioral and clinical risk factors is presented including for self-stimulation, rectal picking, chronic constipation, decreased gut motility, reduced water intake, and a restricted diet. Although a paucity of cases do exist, physical, behavioral, and GI findings common in PWS may contribute to rectal prolapse requiring better awareness and proactive surveillance, management, and treatment protocols for patients affected with this rare obesity-related genetic disorder.

Keywords

- Prader–Willi syndrome
- risk factors
- self-injury
- rectal picking
- prolapsed
- chronic constipation
- restricted diet

Introduction

Prader–Willi syndrome (PWS) is characterized by severe hypotonia in infancy with a poor suck, swallowing and feeding difficulties, hypogenitalism and hypogonadism with cryptorchidism, growth and other hormone deficiencies with short stature, small hands and feet, and developmental delay. Later, mild intellectual disability is common with food seeking and hyperphagia leading to obesity in early childhood, if not externally controlled. Gastrointestinal (GI) problems include constipation, delayed gastric emptying, and decreased gut motility with a risk of megacolon development. Behavioral problems are often present in childhood including self-injury and skin picking, compulsions, anxiety, stubbornness, temper tantrums with outbursts, and later psychiatric problems requiring medical attention and treatment. Autism and psychosis may correlate with specific PWS molecular genetic classes. The most common genetic cause is a paternal deletion of the chromosome 15q11-q13 region followed by maternal disomy 15 in which both chromosome 15s are from the mother due to nondisjunction in meiosis. PWS is recognized as the first example of errors in genomic imprinting and accounts for about 1 in 15,000 live births with more than 400,000 individuals worldwide.[1–6]

Background

Certain abnormal neurodevelopmental behavioral features in PWS specifically skin picking are more common than in other syndromes with intellectual disability. Skin picking is found in 81% of individuals with PWS at an average age of 18 years with 40% of all self-injurious behavior occurring on the legs (41%), particularly the front, 42% on the head including

received
September 23, 2020
accepted after revision
January 8, 2021

Georg Thieme Verlag KG,
Rüdigerstraße 14,
70469 Stuttgart, Germany

DOI https://doi.org/10.1055/s-0041-1724049.
ISSN 2146-4596.

the nose and mouth area, and 39% on the arms.[7] Additionally, 6% of PWS individuals exhibit rectal picking, 9% have hair pulling, 14% have headbanging, and 28% with nose picking.[7–10]

Risk factors in PWS could predispose to rectal damage and prolapse as noted in a previous report of a child with a full-thickness anorectal prolapse,[11] rectal self-mutilation, and bleeding in a 12-year-old girl[12] and three other patients with rectal picking, lower GI bleeding, and anorectal disease.[13] Others have suggested that risk factors in PWS could lead to rectal prolapse but underreported.[14,15] Although hundreds of infants with PWS are born per year in the United States and treated with growth hormone as they grow into adulthood, little information is available about the frequency of rectal damage and prolapse. Risk factors do exist and will be discussed in this case-based review. An illustrative case is presented that stresses the importance of awareness and monitoring for these factors in this rare obesity-related genetic disorder.

An Illustrative Clinical Case of Prolapsed Rectum in Prader–Willi Syndrome

A 14-year-old boy with PWS presented having maternal segmental isodisomy 15 and a history of childhood obesity, behavioral problems with hormonal deficiencies requiring growth hormone and testosterone therapy as the second patient with prolapsed rectum and PWS to be reported in the literature. His weight was 112 kg (> 95%ile) and height was 163 cm (<25%ile) with a body mass index of 42 kg/m^2 (>>95%ile). He had an undescended testicle with a small appearing penis, and small hands and feet. He had a history of skin picking, a dry mouth and does not like to drink fluids, regurgitation, constipation, encopresis with bouts of soiling, and a recent history of hematochezia. He had experienced intermittent bloody stools for several months prior to clinic presentation with chronic constipation over the past several years and recently diarrhea likely related to overflow. The mother had noted blood in his clothing and blood in the stool following defecation several times a week. He was on a restricted diet by history (800–1,000 calories/d) with high fiber containing fruits and vegetables, but will sneak food at times, as commonly seen in PWS. Concerns were raised that the patient may have been inserting objects in the rectum. He denies any fevers, chills, or abdominal pain.

A pediatric gastroenterology evaluation showed normal chloride sweat tests to rule out cystic fibrosis and negative stool cultures. During the stool sample collection, the mother noted a "mass" protruding from his rectum with straining upon defecation accompanied by pain for the past several months. He manipulates the mass back inside his body after defecation. This information was brought to medical attention and a surgical consult was requested. An endoscopy and colonoscopy were performed showing a congested erythematous polyploid ulcerative lesion/mass in the rectum and a solitary colon ulcer at 20 cm from the rectum. Rectal intussusception and a fissure were noted consistent with a prolapsed rectum. Biopsies collected were normal from the sigmoid, descending, transverse, ascending colon regions, and cecum along with a portion of the ileum. He underwent a robotic suture rectopexy under anesthesia with fulguration of anal lesions and rectal intussusception repaired successfully. He has done well since recovery.

Clinical Manifestations in Prader–Willi Syndrome Predisposing to Rectal Prolapse

Rectal picking and/or digital fecal manipulation are recognized in PWS affecting colorectal function as described by Kuhlmann et al[15] in adults with PWS. They found that 40% had constipation with the most common symptom as the feeling of obstructed defecation seen in 42% with less than three defecations per week and straining reported at 37%. Lumpy or hard stools were also seen in 32% of PWS subjects. Our patient did have several of these predisposing findings. The rectal diameter was not different when compared with controls in their study but more PWS subjects were found with a fecal mass in the rectum by digital examination. In evaluating total GI transit time determined by radio-opaque markers compared with controls, they found prolonged gut transit time in PWS with about one-fourth having a transit time more than 3 days and no controls had a transit time requiring that length of time.

In addition, GI problems begin early in life in PWS individuals including a dry mouth accompanied with enamel hypoplasia and caries further complicated by decreased pain sensation, severe central hypotonia, low muscle mass, and decreased strength with decreased physical activity and energy level.[3,16] Swallowing difficulties and regurgitation are seen in PWS with decreased fluid intake, delayed gastric emptying, and prolonged gut transit time with decreased gut motility accompanied by an inability to vomit.[17] Decreased caloric intake is recommended for treating PWS individuals and often includes an abundance of mostly green leafy vegetables and fruits. This change in diet may alter gut flora and along with altered gut motility may predispose to a megacolon.[18] These clinical manifestations in PWS and treatment plans may contribute to rectal intussusception and prolapse. Hormone deficiencies are also recognized in PWS along with a lower metabolic rate.[19] Confounding predisposing factors for developing rectal damage and prolapse besides chronic constipation may include obsessive-compulsions, self-stimulation and self-injury, rectal picking, and digital manipulation along with a lower pain sensation compared with the general population.[3]

Skin picking behavior in PWS can be pronounced leading to significant comorbidities including bleeding and loss of tissue at the wound sites with infections and ulcerations requiring medical and/or surgical intervention. Rectal picking can cause tissue damage and infection as an extension of self-injurious behavior, due to GI dysfunction (e.g., chronic constipation with digital removal of stool, irritable bowel disorder, or anal irritation). Rectal picking by itself can be severe with significant comorbidities and lower quality of life.[11] Damage to the mucosa and musculature from rectal picking and/or digital manipulation to remove hard fecal

material can lead to bleeding and prolapse. Other GI findings in PWS may be contributing factors to rectal damage and prolapse including dry mucosa with decreased salivary secretion, increased choking risks, decreased vomiting, regurgitation, swallowing difficulties with silent aspiration. Delayed gastric emptying and gut transit time with altered gut flora, constipation, an increased risk of gastric dilatation, and rupture with megacolon development which may also contribute but more research is needed.[3,4,20]

Constipation may also be a trigger for rectal picking beyond the behavioral manifestations seen in PWS predisposing to rectal trauma and prolapse. Dry rectal mucosal may be present as well as a dry mouth and oral mucosa with decreased secretions as cardinal features in PWS. Crohn's disease can also be a factor causing rectal fistulae, abscesses, and ulcerations causing damage to the rectal mucosa and muscular predisposing to rectal pathology.[21] The current case described is the second reported patient with PWS and a prolapsed rectum requiring surgical repair. A previously reported PWS patient with prolapsed rectum in the literature and surgical repair also had obsessive–compulsive traits including digital manipulation of the anus and chronic constipation.[11]

Management, Prognosis, and Outcome Findings in Prader–Willi Syndrome

PWS is a rare obesity-related genetic disorder with multisystem involvement and identified risk factors for a prolapsed rectum, presumably as a consequence of GI issues (chronic constipation, decreased gut transit time, changes in diet, and decreased secretions and fluid intake) and behavioral problems (obsessive–compulsions, self-stimulation and rectal picking and injury, and decreased pain sensation). Although risk factors do exist, only one PWS patient with rectal prolapse has been reported previously and may suggest an underrecognition or reporting in this rare syndrome. Our aim was to bring this finding to the attention of health caregivers and providers for PWS. Furthermore, findings in PWS may complicate anorectal surgery due to picking at the surgical sites with associated wound infections and delayed healing, postsurgical site hernias, bowel obstruction, or fecal impaction. Narcotic pain medication should be discouraged because of constipating effects.[11] Other factors in PWS that should be addressed prior to surgery include an anesthesia risk for a narrow airway, obesity with associated cardiovascular and pulmonary compromise, hormone imbalance including possible low adrenocorticotropic hormone (ACTH) and cortisol levels, decreased muscle mass and strength, and prolonged postsurgical recovery time following surgery.[3]

Conclusion

PWS is a rare disorder with obesity as a cardinal feature with behavioral comorbidities that may predispose patients to rectal prolapse requiring surgical repair but underreported to date. These risk factors include GI issues with chronic constipation, decreased gut transit time, and secretion complicated by behavioral problems of self-injury and stimulation, rectal picking, and damage related to decreased pain sensation common in this disorder. Awareness of surgical complications in PWS is also important for better care and treatment of those with PWS undergoing surgical procedures such as rectal prolapse repair.

Conflict of Interest

None declared.

Acknowledgments

I thank Grace Graham for preparation of manuscript and the support from the National Institute of Child Health and Human Development (NICHD), grant number HD02528. I thank the family and individual with Prader–Willi syndrome for allowing the description of this clinical report and support from the Prader-Willi Syndrome Association (USA).

References

1 Butler MG. Prader-Willi syndrome: current understanding of cause and diagnosis. Am J Med Genet 1990;35(03):319–332
2 Butler MG, Thompson T. Prader-Willi syndrome: clinical and genetic findings. Endocrinologist 2000;10(04, Suppl 1):3S–16S
3 Butler MG, Lee PDK, Whitman BY. Management of Prader-Willi Syndrome. New York, NY: Springer; 2006
4 Cassidy SB, Schwartz S, Miller JL, Driscoll DJ. Prader-Willi syndrome. Genet Med 2012;14(01):10–26
5 Butler MG, Hartin SN, Hossain WA, et al. Molecular genetic classification in Prader-Willi syndrome: a multisite cohort study. J Med Genet 2019;56(03):149–153
6 Butler MG, Duis J. Chromosome 15 imprinting disorders: genetic laboratory methodology and approaches. Front Pediatr 2020; 8:154
7 Symons FJ, Butler MG, Sanders MD, Feurer ID, Thompson T. Self-injurious behavior and Prader-Willi syndrome: behavioral forms and body locations. Am J Ment Retard 1999;104(03):260–269
8 Dykens E, Shah B. Psychiatric disorders in Prader-Willi syndrome: epidemiology and management. CNS Drugs 2003;17(03):167–178
9 Morgan JR, Storch EA, Woods DW, Bodzin D, Lewin AB, Murphy TK. A preliminary analysis of the phenomenology of skin-picking in Prader-Willi syndrome. Child Psychiatry Hum Dev 2010;41 (04):448–463
10 Hustyi KM, Hammond JL, Rezvani AB, Hall SS. An analysis of the topography, severity, potential sources of reinforcement, and treatments utilized for skin picking in Prader-Willi syndrome. Res Dev Disabil 2013;34(09):2890–2899
11 Potter DD, Bruny JL, Allshouse MJ, Narkewicz MR, Soden JS, Partrick DA. Laparoscopic suture rectopexy for full-thickness anorectal prolapse in children: an effective outpatient procedure. J Pediatr Surg 2010;45(10):2103–2107
12 Campeotto F, Naudin C, Viot G, Dupont C. Rectal self-mutilation, rectal bleeding and Prader-Willi syndrome [in French]. Arch Pediatr 2001;8(10):1075–1077
13 Bhargava SA, Putnam PE, Kocoshis SA, Rowe M, Hanchett JM. Rectal bleeding in Prader-Willi syndrome. Pediatrics 1996;97 (02):265–267
14 Whittington J, Holland A. Neurobehavioral phenotype in Prader-Willi syndrome. Am J Med Genet C Semin Med Genet 2010;154C (04):438–447
15 Kuhlmann L, Joensson IM, Froekjaer JB, Krogh K, Farholt S. A descriptive study of colorectal function in adults with Prader-Willi Syndrome: high prevalence of constipation. BMC Gastroenterol 2014;14:63

16 Butler MG, Theodoro MF, Bittel DC, Donnelly JE. Energy expenditure and physical activity in Prader-Willi syndrome: comparison with obese subjects. Am J Med Genet A 2007;143A(05):449–459
17 Gross RD, Gisser R, Cherpes G, Hartman K, Maheshwary R. Subclinical dysphagia in persons with Prader-Willi syndrome. Am J Med Genet A 2017;173(02):384–394
18 Alyousif Z, Miller JL, Sandoval MY, MacPherson CW, Nagulesapillai V, Dahl WJ. The effects of Bifidobacterium animalis ssp. lactis B94 on gastrointestinal wellness in adults with Prader-Willi syndrome: study protocol for a randomized controlled trial. Trials 2018;19(01):256
19 Butler MG, Hossain WA, Tessman R, Krishnamurthy PC. Preliminary observations of mitochondrial dysfunction in Prader-Willi syndrome. Am J Med Genet A 2018;176(12):2587–2594
20 Stevenson DA, Heinemann J, Angulo M, et al. Gastric rupture and necrosis in Prader-Willi syndrome. J Pediatr Gastroenterol Nutr 2007;45(02):272–274
21 Salehi P, Lee D, Ambartsumyan L, Sikka N, Scheimann AO. Rectal picking masquerading as inflammatory bowel disease in Prader-Willi syndrome. J Pediatr Gastroenterol Nutr 2018;67(01):59–63

