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Ileal pouch anal anastomosis in women of childbearing age: The impact of surgery upon sexual function, fertility, pregnancy, and mode of delivery

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ABSTRACT

Proctocolectomy with ileal pouch-anal anastomosis (IPAA) is the mainstay of surgical management for medically refractory ulcerative colitis as well as familial adenomatous polyposis. These procedures are often performed on women of childbearing age and therefore have significant potential impact on future childbearing for these patients. Specifically, IPAA may result in variable changes in sexual function and a well-documented decrease in fertility, likely secondary to distortion of fallopian anatomy and adhesions after dissection. Knowledge of these aspects of IPAA are important for colorectal surgeons as they counsel patients preoperatively and for both colorectal surgeons and obstetricians as they advise their patients with IPAA post-operatively on matters related to sexual function, reproductive health, and delivery.

Ileal pouch-anal anastomosis (IPAA) was described in the 1970s for the treatment of medically refractory ulcerative colitis (UC). It is also frequently performed for the management of familial adenomatous polyposis (FAP). Although the operation has undergone many iterations and advancements since that time the goal remains the same, removal of the diseased colorectal mucosa through total proctocolectomy while preserving the function of the anal sphincter and thus the mechanism for fecal continence.[1,2] Initially performed as an open procedure, advances in surgical technology, including laparoscopy and robotics, have led to an increasing variety of approaches and methods for performing this procedure.[3–5] Because of the nature of the diagnoses for which it is indicated, this is a procedure that is frequently performed on young adults. For women in particular, this poses challenges relating to post-operative sexual function, fertility, conception, and delivery. Over the last 3 decades, a growing body of medical literature has been devoted to the study of outcomes of this operation in women of childbearing age, particularly raising concerns related to decreased post-operative fertility. The outcomes that will be discussed include sexual function, fertility, pregnancy, and mode of delivery.

Post-operative sexual function

Changes in post-operative sexual function in women after IPAA have been proposed to be related to two possible sources. Anatomic concerns include anatomic changes in the angle of the vagina or pain from pelvic adhesions as well as potential for nerve damage during pelvic dissection. Ongoing gastrointestinal symptoms such as fecal incontinence or frequent bowel movements represent another potential barrier to sexual activity and are frequently cited as concerns by women who have undergone IPAA. In a 2014 review article Bharadwaj et al. found that, while dyspareunia was commonly reported by women after IPAA, it was not significantly more common than the rates reported by women in the general population.[6] Stooling and concerns related to this seem to pose the greatest barrier to normal sexual function for women after IPAA. In one early survey of women on this topic, 7% reported that they experienced fecal incontinence during intercourse.[7] Metcalf et al. on the other hand, noted that the majority of women that they surveyed reported increased frequency of sexual intercourse after IPAA, frequently citing an improvement in general health as the reason for an increase in sexual activity[8] (**Table 1**).

Post-operative fertility

There is substantial evidence that fertility can be adversely affected in women undergoing IPAA. Ørding Olsen et al. elegantly demonstrated this in a 2002 study comparing women with UC undergoing IPAA with a reference population of healthy women in Denmark and Sweden.[9] They compared fecundity of women with UC to the reference population both before and after IPAA. Prior to surgery, women with UC became pregnant at the same rate as those without UC. After surgery, the incidence of pregnancy in those attempting to become pregnant dropped significantly. This suggested that the disease process is not responsible for the decrease in fertility, but rather that the operation is contributing to infertility. This must be considered in light of a previous study suggesting that patients with refractory ulcerative colitis who

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Table 1
Post-operative sexual function.

Study	Year	Design	Format	Patient number	Outcome (n)	Mean follow-up	Conclusion
Metcalf[8]	1986	Case control	Structured interview	100 (50 IPAA, 50 Kock Pouch)	Increased frequency of intercourse (35)*, dyspareunia before operation (46%), dyspareunia after operation (33%)	28 months	Significant increase in frequency of intercourse post-operatively.
Counihan[7]	1994	Retrospective	Questionnaire	110	Dyspareunia (31), fecal incontinence during intercourse (15)	41 months	Sexual function can be impaired after IPAA

* IPAA only.

undergo IPAA report have an increased frequency of sexual activity.[8] This was likewise borne out in Ørding Olsen's study, with 27.6% of the women with ulcerative colitis reporting that they had not attempted to become pregnant prior to surgery, many citing the severity of their disease as the reason that they had delayed childbearing. After 60 months of follow-up the incidence of pregnancy in women having regular unprotected intercourse was 36% compared to 88% in the reference population.

This adverse impact upon fertility was further borne out by Gorgun et al. in a retrospective cohort of 300 women in whom a statistically significant decrease in fertility was also demonstrated.[10] They specifically assessed a subgroup of patients who had attempted to become pregnant both before and after IPAA. Of 56 women in this category, 69% became pregnant after 1 year of unprotected intercourse prior to IPAA, while 46% became pregnant after 1 year of unprotected intercourse following the operation. They also assessed perioperative factors such as type of pouch, presence of proximal diversion, and the use of Seprafilm^{R} in patients who attempted to become pregnant after surgery and found that no factors had a significant effect upon the rate of successful conception. Rates of fertility in these patients were compared to age-matched controls from US census data.

Multiple additional studies have demonstrated this decline in fertility following IPAA. There is evidence to suggest that this decrease in fertility represents a mechanical problem, likely related to adhesion formation after pelvic dissection. This has been demonstrated from several different aspects. One study of 21 women undergoing hysterosalpingography and vaginography after IPAA showed distortion of the fallopian tubes in 17 of 21 patients.[11] This is also suggested by the findings of Bartels et al. who performed a cross-sectional study of women of childbearing age undergoing IPAA and compared outcomes in patients undergoing laparoscopic vs. open IPAA. They found that time to first pregnancy was significantly shorter in the group undergoing laparoscopic surgery.[12]

Although women after IPAA appear to have difficulty becoming pregnant, there are data to suggest that they respond normally to methods of assisted reproduction that bypass the need for sperm and ova to traverse the fallopian tube and that they are able to successfully carry a pregnancy once established. Pabby et al. performed a retrospective cohort study comparing outcomes of in vitro fertilization (IVF) for women with ulcerative colitis who had undergone IPAA, women with ulcerative colitis who had not undergone IPAA and women without inflammatory bowel disease. There was no statistically significant difference in outcomes of IVF for these three groups.[13] This is again suggestive of a mechanical basis for the fertility difficulties of women after IPAA as they do not have decreased conception relative to the general population when using assisted reproduction that bypasses the fallopian tube (**Table 2**).

Pregnancy and mode of delivery

When women who have undergone IPAA become pregnant, multiple studies show that they are more likely than the general population to undergo cesarean section.[14,15] Many retrospective studies which have examined symptoms of pouch dysfunction such as incontinence and frequency of bowel movements have shown that, while patients tend to have an increase in these symptoms during pregnancy,[16,17] vaginal delivery does not result in an increase in these symptoms post-partum. They found that functional outcomes, as demonstrated by patient-reported symptoms, were the same after vaginal and after cesarean section delivery, concluding that cesarean section should only be used when indicated for obstetric reasons, and that history of IPAA should not preclude a patient from attempting vaginal delivery if it is otherwise indicated for her to do so.[14–19]

This does not, however, appear to align with what is being recommended to patients. In a survey of gastroenterologists, colorectal surgeons, and obstetricians, both colorectal surgeons and gastroenterologists tended to recommend against vaginal delivery, while obstetricians recommended vaginal delivery for patients with IPAA.[20] The concern often cited by those recommending against vaginal delivery in patients with a history of IPAA is the possibility of traumatic delivery with its long term consequences should there be damage to the anal sphincter. This concern may be well founded when it comes to long-term patient outcomes. Remzi et al. performed functional surveys as well as endosonography and anal manometry on 57 women who gave birth post-IPAA, comparing women who gave birth via cesarean section to women who had at least one vaginal delivery.[21] While the outcomes of their functional surveys concurred with previously published data (i.e. women who had vaginal deliveries did not report worse functional outcomes), endosonography demonstrated an increased rate of anterior sphincter defects and manometry showed a lower mean anal squeeze pressure in women who delivered vaginally (**Table 3**).

Discussion

In summary, for women of childbearing age, undergoing IPAA may result in decreased post-operative fertility and longer times to first pregnancy for those who are able to conceive. This should be clearly discussed with women of childbearing age during pre-operative counseling. Given the likely mechanical nature of this problem as well as the fact that outcomes with respect to fertility are improved when laparoscopic approaches have been used, it appears advisable to pursue minimally invasive approaches when feasible. Other methods of preventing adhesions have been attempted with mixed results. A 2014 Cochrane review assessing the use of adhesion prevention technologies such as gels showed a decrease in overall adhesions with some of these products; however, no product significantly increased the rate of live births.[22]

Given their increased risk for infertility, women who desire to conceive post-IPAA should receive early referral for assisted reproduction if they do not conceive easily, as they are at an increased risk of functional obstruction of the fallopian tubes and have been shown to have good outcomes with assisted reproduction.

There is at this point no consensus on the recommendations regarding method of delivery for pregnant women with a history of IPAA. While multiple retrospective studies suggest that short-

Table 2
Fertility following ileal pouch-anal anastomosis.

Study	Year	Design	Format	Patient number	Outcome	Mean follow-up	Conclusion
Metcalf[8]	1986	Retrospective case control	Structured interview	100	Pregnancy before IPAA (32), pregnancy after IPAA (6)	28 months	Pregnancy possible after IPAA. Fertility minimally decreased.
Asztely[11]	1991	Case series	Radiologic exam	21 patients, 6 controls	Anatomical changes in the vagina and adnexa		Pathologic changes in fallopian anatomy found in 17 patient undergoing colectomy.
Counihan[7]	1994	Retrospective	Questionnaire	110	Pregnancy after IPAA (19 women, 23 births), vaginal delivery (5), cesarean (18), increased bowel movements during pregnancy (4)	41 months	No conclusion regarding fertility
Ørding Olsen[9]	2002	Retrospective cohort	Structured interview	290 patients, 661 controls	Pregnancy		Fecundity in women with UC is unaffected up until the time of surgery, then decreases following.
Gorgun[10]	2004	Retrospective	Questionnaire	300	Pregnancy after 1 year of unprotected intercourse	8.3 years	Statistically significant increased infertility in women after IPAA (38% before, 56% after).
Lepisto[14]	2007	Retrospective case control	Questionnaire	138 patients with UC and IPAA, 130 controls with appendectomy	Time to pregnancy	9.2 years	After 4 years 73% of women with IPAA became pregnant, compared to 91% of controls. Median time to pregnancy 14 months longer for IPAA patients.
Bartels[12]	2012	Retrospective	Questionnaire	160, 50 patients attempted to conceive 23 after open IPAA 27 after laparoscopic	Time to first spontaneous pregnancy	9.4 years	70% in laparoscopic group became pregnant spontaneously compared to 39% in open group. Time to pregnancy was shorter for laparoscopic patients.
Pabby[13]	2014	Retrospective cohort	Chart review	22 patients with UC after IPAA, 49 patients with non-operated UC, 470 patients without IBD	Live birth after IVF		Tubal factor cause of infertility in 54.5% of IPAA patients compared to 8.2% for non-operated UC patient and 14% of non-IBD patients. No statistically significant difference in first cycle or cumulative live birth rate after IVF in women with UC after IPAA compared to non-operated UC or women without IBD.

Table 3
Pregnancy and Mode of Delivery

Study	Year	Design	Format	Patient number	Outcome	Mean follow-up	Conclusion
Juhasz[16]	1995	Retrospective	Questionnaire	43 patients after IPAA. 19 cesarean sections, 24 vaginal deliveries	Changes in pouch function after delivery		Stool frequency and incontinence worsened during pregnancy but returned to normal after post-partum period; no significant difference between cesarean and vaginal deliveries for these outcomes.
Scott[19]	1996	Retrospective	Questionnaire	12 patients	Stool frequency at 6 months post-partum	33 months	No statistically significant increase in stool frequency.
Ravid[17]	2002	Retrospective	Questionnaire	38 patients, 29 delivered after IPAA	Pouch function after delivery	54 months	No statistically significant difference between patients who underwent cesarean compared to vaginal delivery.
Hahnloser[18]	2004	Retrospective	Questionnaire	450 patients	Pregnancy after IPAA		Significantly increased number of daily stools in long term follow-up of IPAA patient after pregnancy compared to pre-pregnancy.
Burke[15]	2017	Retrospective	Chart review	59 with Crohn's disease, 65 with UC, 21805 without IBD	Cesarean delivery		UC patients were more likely than women without IBD to have cesarean (RR1.8). All women with IPAA underwent cesarean.

term pouch function remains the same with vaginal delivery, the only study to assess the pouch physiologically found decreased anal muscle tone and increase in anterior sphincter defects in women who underwent vaginal deliveries after IPAA. This presents a significant concern about the potential long-term effects of vaginal delivery on pouch function. There are, as yet, no prospective studies of pouch function before and after vaginal delivery. This represents an area for ongoing research given the variability in what is recommended to patients by their providers and the potentially devastating impact of anal sphincter trauma on pouch function and patient quality of life.

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