

# Dysplasia of the Anal Transitional Zone After Ileal Pouch-Anal Anastomosis

## Results of Prospective Evaluation After a Minimum of Ten Years

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**PURPOSE:** Stapling of the ileal pouch-anal anastomosis with preservation of the anal transitional zone remains controversial because of concerns about the potential risk of dysplasia and cancer. The natural history and optimal treatment of anal transitional zone dysplasia ten or more years after surgery are unknown. This study establishes the risk of dysplasia in the anal transitional zone and the outcome of a conservative management policy for anal transitional zone dysplasia, with a minimum of ten years' follow-up after ileal pouch-anal anastomosis. **METHODS:** A total of 289 patients undergoing anal transitional zone-sparing stapled ileal pouch-anal anastomosis for inflammatory bowel disease between 1986 and 1990 were studied. Patients undergoing anal transitional zone-sparing ileal pouch-anal anastomosis who were studied with serial anal transitional zone biopsies for at least ten years postoperatively were included (n = 178). Median follow-up was 130 (range, 120–157) months. **RESULTS:** Anal transitional zone dysplasia developed in 8 patients 4 to 123 (median, 9) months after surgery. There was no association with gender, age, preoperative disease duration, or extent of colitis, but the risk of anal transitional zone dysplasia was significantly associated with cancer or dysplasia as a preoperative diagnosis or in the proctocolectomy specimen. Dysplasia was high grade in two patients and low grade in six. Two patients with low-grade dysplasia on two or more occasions after detection of low-grade

dysplasia underwent completion mucosectomy and perineal pouch advancement with neo-ileal pouch-anal anastomosis. One patient with high-grade dysplasia on two occasions was to undergo completion mucosectomy, but this was not technically feasible. Partial mucosectomy with vigorous anal transitional zone biopsy was performed with close postoperative surveillance. Biopsies were negative for dysplasia. The second recently diagnosed patient with high-grade dysplasia underwent examination under anesthesia with negative anal transitional zone biopsies and will be kept under close surveillance. No cancer in the anal transitional zone was found during the study period. The 4 other patients with low-grade dysplasia on 1 or 2 occasions were treated expectantly and have been dysplasia free for a median of 119 (range, 103–133) months. **CONCLUSIONS:** Anal transitional zone dysplasia after stapled ileal pouch-anal anastomosis is infrequent and is usually self-limiting. Anal transitional zone preservation did not lead to the development of cancer in the anal transitional zone with a minimum of ten years of follow-up. Long-term surveillance is recommended to monitor dysplasia. If repeat biopsy confirms persistent dysplasia, mucosectomy with perineal pouch advancement and neo-ileal pouch-anal anastomosis is recommended. [Key Words: Ileal pouch; Cancer; Inflammatory bowel disease; Anal transitional zone; Dysplasia; Surgery; Treatment]

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Proctocolectomy with ileal pouch-anal anastomosis (IPAA) is the procedure of choice for the majority of patients with mucosal ulcerative colitis and indeterminate colitis who require surgery. With its very low mortality and acceptable morbidity, it has largely replaced the permanent ileostomy in these patients.<sup>1</sup> Since its initial description in 1978, this procedure has gained wide acceptance in the surgical treatment of patients with ulcerative colitis and familial adenomatous polyposis.<sup>2</sup> Modifications of this procedure have occurred since the original description of total proctocolectomy, anorectal mucosectomy, handsewn IPAA, and diverting ileostomy. One modification, in which the ileal pouch is stapled to the anus with preservation of the anal transitional zone (ATZ), remains somewhat controversial.<sup>3,4</sup>

When an IPAA is performed, controversy exists about the technique to be used for the pouch-anal anastomosis. Techniques vary between a handsewn IPAA with mucosectomy of the ATZ or a stapled IPAA at the level of the anorectal ring without mucosectomy of the ATZ.<sup>5</sup> To remove the rectal mucosa as completely as possible, a mucosectomy and handsewn anastomosis are necessary. This technique takes longer and has a relatively high risk for postoperative functional problems related to seepage and incontinence related to anal canal manipulation.<sup>6</sup> In addition, mucosal columnar epithelial cells may remain in the ATZ after total mucosectomy in 20 percent of patients with resected pouches.<sup>7</sup> In contrast, when the pouch-anal anastomosis is stapled, the procedure is simpler and less likely to result in functional problems.<sup>6</sup> However, to allow transanal insertion of the stapler head, it is usually necessary to leave a 1-cm to 2-cm strip of rectal/ATZ mucosa that is at risk of developing dysplasia or cancer.<sup>8</sup>

Here is the argument between mucosectomy with handsewn anastomosis and stapled anastomosis with ATZ preservation: safety and good function *vs.* adequacy of risk reduction. Although the risk of dysplasia in the ATZ after stapled anastomosis was thought to be low, it was only recently that the five-year to ten-year incidence and risk of ATZ dysplasia, reported from this department, demonstrated this to be the case.<sup>9</sup> Thus, the aim of the present study was to determine the risk and natural history of dysplasia in the ATZ and the outcome of a conservative management policy with a minimum follow-up of ten years after stapled IPAA surgery.

## PATIENTS AND METHODS

Two hundred eighty-nine patients undergoing total proctocolectomy with IPAA between 1986 and 1990 were reviewed. All data were obtained from the Cleveland Clinic Foundation Ileal Pouch Registry. All patients had a preoperative diagnosis of ulcerative colitis or indeterminate colitis. In all cases, the rectum was completely excised, and a single-stapled or double-stapled side-to-end or end-to-end anastomosis was performed between the ileal pouch and the top of the anal canal. No patient with a known preoperative diagnosis of carcinoma of the rectum or of dysplasia within 8 cm of the anal verge was considered for stapled IPAA; instead, such patients underwent mucosectomy and handsewn anastomosis. Only patients with at least 10 years of follow-up with serial biopsies of the ATZ or those who underwent excision of ATZ after stapled IPAA during this time (n = 178) were included in the study.

Patients underwent between 1 and 6 random pinch biopsies (2 mm) of the ATZ taken through a rigid endoscope under direct vision. In the majority of cases, these were performed at intervals of between six months and two years. The stapled anastomosis was carefully identified under direct vision, and biopsy samples were taken between this and the dentate line. ATZ dysplasia was diagnosed and graded according to the criteria of the Inflammatory Bowel Disease Morphology Study Group.<sup>10</sup>

When the study commenced, there were 85 patients available in the database with at least 10 years of serial ATZ biopsies since their original pouch surgery. The remaining patients were contacted by phone, e-mail, or mail. Fifty-three patients who had been followed up but did not have a biopsy at ten or more years were brought in from various states and rebiopsied. Forty patients' biopsy results or slides were requested from outside institutions. A total of 892 biopsy results were reviewed for 178 patients. Two pathologists who have a special interest in inflammatory bowel disease (A.O. and R.E.P.) reviewed all definite or indefinite dysplasia results from our institution and outside institutions. This brought the total number of patients in the study to 178. The institutional review board approved this study, and no patient was refused examination for insurance reasons.

Association between the presence of preoperative and postoperative risk factors and the presence of ATZ dysplasia was evaluated by logistic regression analyses and Fisher exact tests for quantitative and

categorical risk factors, respectively. Analyses were performed with the SPSS<sup>®</sup> statistical software package (SPSS Inc., Chicago, IL). A *P* value less than 0.05 was considered statistically significant.

## RESULTS

Of the 289 patients, 178 were identified with ATZ serial biopsies performed at least 10 years after IPAA surgery, and these were designated as the study cohort. There were 89 males in the study. A total of 77 patients were not included in the study because they refused to come to our institution or to their local institutions for various reasons. "I am doing very well, and I am too busy to come" was the main reason (37/77) given for the refusals. Fifteen patients were completely lost to follow-up or could not be found. Eight patients died after pouch surgery, with none of these deaths related to cancer or dysplasia occurrence in the ATZ. Twenty-two patients had pouch failure, defined as pouch excision or diversion. Eleven patients in this group had ten years or more of follow-up and were included in the study. The 111 patients who were not included in the study because of nonparticipation, lack of follow-up, or pouch failure did not differ in baseline characteristics from the study population.

The estimated incidence of ATZ dysplasia in the present study was 4.5 percent. A 95 percent confidence interval based on the binomial distribution was 2 and 8.7 percent. Histologic examination of the excised colorectal specimen at the time of ileal pouch construction revealed a final diagnosis of ulcerative colitis in 152 patients (85 percent), indeterminate colitis in 20 (11 percent), and Crohn's disease in 6 (4 percent). Six patients had a preoperative diagnosis of cancer of the colon. Twenty-six patients had evidence of dysplasia in the colon or rectum on preoperative surveillance biopsy.

No patient developed carcinoma of the ATZ. Median follow-up of the ATZ with biopsy and histologic examination was 130 (range, 120–157) months. Eight patients developed dysplasia, of which six were low-grade dysplasias (LGD) and two were high-grade dysplasias (HGD). There were no symptoms related to dysplasia. Only one patient with HGD had a small irregularity in the ATZ before mucosectomy. Patients who developed dysplasia in the ATZ were compared with those without dysplasia. There was no relationship between gender, age at the time of pouch surgery, duration of disease before surgery, and extent of colitis between the groups (Table 1). The median interval from surgery to the detection of dysplasia was nine (range, 4–123) months.

Two patients had LGD of the ATZ detected on three separate occasions. After surveillance of the LGD for 29 and 38 months, respectively, the ATZ was excised transanally in each case with perineal pouch advancement with neo-IPAA. Both had LGD in the resected mucosectomy specimen; no cancer was found. Four other remaining patients with LGD on one or two occasions were managed with continued surveillance only. Repeat ATZ biopsies performed on a median of 6 (range, 6–12) occasions failed to demonstrate ATZ dysplasia, and the median elapsed time from the last detection of dysplasia to the most recent biopsy was 119 (range, 103–133) months.

A different patient underwent 5 serial ATZ biopsies, which were negative for dysplasia, before HGD of the ATZ was detected 51 months after surgery. A repeat biopsy 4 months later was negative for dysplasia, but HGD was again seen 61 months postoperatively. There was also some irregularity and elevation at the anterior ATZ. The patient returned to surgery after a further eight weeks, at which time mucosectomy and neo-IPAA were planned. However, this was not tech-

**Table 1.**  
Demographics, Duration of Disease, and Extent of Disease in Patients With or Without Dysplasia of the Anal Transitional Zone

	ATZ Dysplasia (n = 8)	No ATZ Dysplasia (n = 170)	<i>P</i> Value
Age at time of surgery (yr)	40.3 ± 7.04	37.3 ± 11.63	NS
Gender, (male/female ratio)	5/3	84/86	NS
Duration of disease (yr)	9.76 ± 8.15	9.79 ± 8.15	NS
Extent of disease (n (%))			
Left-sided	1 (12.5)	16 (9.4)	NS
Pancolitis	7 (87.5)	154 (90.6)	NS

ATZ = anal transitional zone; NS = not significant.  
Plus/minus values are mean ± standard deviation.

nically feasible because of inadequate mobility of the pouch to allow anastomosis after completion mucosectomy. Thus, a partial mucosectomy was performed, with vigorous biopsy specimens of the ATZ comprising an estimated one-third of the surface area of the ATZ removed. No dysplasia was seen, and the patient has had negative biopsies of the ATZ on 3 occasions during the 48 months since HGD was last detected. However, at 48 months, there was HGD found in the pouch itself, although the ATZ biopsies were free of dysplasia. This patient also has been treated for chronic pouchitis. Two subsequent biopsies of the pouch and ATZ did not show any further dysplasia 35 months later. Overall, there was no recurrence of dysplasia in the ATZ after 83 (48 + 35) months of follow-up.

The most recently diagnosed patient with ATZ HGD had preoperative colonic dysplasia as a risk factor. This patient underwent 6 serial ATZ biopsies, which were negative for dysplasia, before HGD of the ATZ was detected 123 months after surgery. This patient went through examination under anesthesia with multiple vigorous biopsies. Mucosectomy was not recommended in the absence of dysplasia on repeat biopsy. Additional surveillance was planned for three months later.

Five of eight patients who developed dysplasia in

the ATZ had high-risk preoperative risk factors, whereas three did not. Patients' preoperative and postoperative risk factors, management, and outcome are summarized in Table 2. The incidence of postoperative ATZ dysplasia in the presence or absence of risk factors is summarized extensively in Table 3. Patients with a history of either colorectal cancer or dysplasia were at higher risk of developing subsequent ATZ dysplasia. In addition, there was a significant association between the preoperative detection of colonic dysplasia and subsequent ATZ dysplasia. Interestingly, preoperative (all were known to be above 8 cm except 1) or postoperative detection of rectal dysplasia did not increase the risk of dysplasia in the ATZ. The distal extent and location of dysplasia preoperatively and postoperatively did not increase the risk of dysplasia in the ATZ. No patient developed cancer or lost their pouch because of cancer or dysplasia in the ATZ.

## DISCUSSION

The aim of mucosectomy is to eradicate the colitis in the ATZ and eliminate the subsequent neoplastic or inflammatory changes of the retained rectal/ATZ mucosa in patients with mucosal ulcerative colitis. However, complete excision cannot reliably be achieved,

**Table 2.**  
Risk Factors and Outcome Of Patients With ATZ Dysplasia

Patient #	Preop Dysplasia	Preop Cancer	Postop Dysplasia	Postop Cancer	Postop Initial Dysplasia in ATZ	Surveillance and Outcome
1	Rectal* HGD	No	Rectal and colon HGD	Rectum	LGD 7 months	10 serial Bx and no rec in 124 months
2	Hepatic flexure LGD	Splenic flexure	Splenic flexure	Splenic flexure	HGD 51 months	Partial mucosectomy; 7 serial Bx and no rec in 83 months
3	Colonic LGD	No	Rectal HGD	No	LGD 6 months	LGD × 3 in 38 months, serial Bx; mucosectomy
4	Sigmoid HGD	No	Sigmoid HGD	Sigmoid	LGD 29 months	LGD × 3 in 29 months, serial Bx; mucosectomy
5	Sigmoid LGD	No	No	No	HGD 123 months	Repeat Bx was negative for dysplasia
6	No	No	No	No	LGD 11 months	6 serial Bx and no rec in 103 months
7	No	No	No	No	LGD 4 months	LGD × 2 and 6 Bx, no rec in 133 months
8	No	No	No	No	LGD 5 months	6 serial Bx and no rec in 114 months

ATZ = anal transitional zone; Preop = preoperative; Postop = postoperative; HGD = high-grade dysplasia; LGD = low-grade dysplasia; Bx = biopsy; and rec = recurrence.

\* Location of preoperative rectal dysplasia unknown.

**Table 3.**

Incidence of Postoperative ATZ Dysplasia in the Presence of Pre and Postoperative Risk Factors for Dysplasia

Risk Factor	Risk Factor Present? (n = 178)	Patients With ATZ Dysplasia (n = 8)	P Value
Preop diagnosis of CR cancer	Yes = 6 No = 172	Yes = 1 (16.7) No = 7 (4)	NS 0.22
Preop diagnosis of CR dysplasia	Yes = 26 No = 152	Yes = 5 (19.2) No = 3 (2)	0.0018*
Preop diagnosis of colon cancer	Yes = 6 No = 172	Yes = 1 (16.7) No = 7 (4)	NS 0.22
Preop diagnosis of rectal cancer	Yes = 0 No = 178	Yes = 0 No = 8	NA
Preop diagnosis of colon dysplasia	Yes = 22 No = 156	Yes = 4 (18.2) No = 4 (2.6)	0.0081*
Preop diagnosis of rectal dysplasia	Yes = 5 No = 173	Yes = 1 (20)† No = 7 (4.0)	NS 0.191
Preop diagnosis of CR cancer or dysplasia	Yes = 28 No = 150	Yes = 5 (18) No = 3 (2)	0.0025*
Postop diagnosis of CR cancer	Yes = 8 No = 170	Yes = 3 (37.5) No = 5 (2.9)	0.003*
Postop diagnosis of CR dysplasia	Yes = 23 No = 155	Yes = 4 (17.4) No = 4 (2.6)	0.0096*
Postop diagnosis of colon cancer	Yes = 7 No = 171	Yes = 2 (28.6) No = 6 (3.5)	0.03*
Postop diagnosis of rectal cancer	Yes = 1 No = 177	Yes = 1 (100) No = 7 (4)	0.045*
Postop diagnosis of colon dysplasia	Yes = 16 No = 162	Yes = 3 (18.8) No = 5 (3.1)	0.023*
Postop diagnosis of rectal dysplasia	Yes = 10 No = 168	Yes = 2 (20) No = 6 (3.8)	NS 0.06
CR cancer or dysplasia diagnosed before or after surgery	Yes = 31 No = 147	Yes = 5 (16.1) No = 3 (2)	0.0041*
CR cancer diagnosed before or after surgery	Yes = 11 No = 167	Yes = 3 (27.3) No = 5 (3)	0.0075*

ATZ = anal transitional zone; Preop = preoperative; CR = colorectal; NS = not significant; NA = not applicable; Postop = postoperative.

Values are n (%).

\* Significant *P* value.

† Preoperative location of dysplasia in rectum unknown.

and remnants of residual mucosa can occur in up to 20 percent of cases after mucosectomy.<sup>7</sup> Proponents of the stapled technique highlight its safety, improved functional results, and reduced operating time compared with mucosectomy and handsewn anastomosis.<sup>5,11</sup> However, controversy still exists between surgeons whether to perform mucosectomy and handsewn anastomosis or a stapled anastomosis, primarily because of the potentially increased risk of development of cancer of the ATZ.

We recently published our results on the risk of developing dysplasia in the ATZ five to ten years after surgery.<sup>9</sup> The results of the previous study confirmed that the risk of dysplasia is very low from approximately five to ten years after surgery. We have been one of the leading groups who have been proponents

of stapled anastomosis. The present study reports a longer follow-up, with at least ten years of surveillance of the ATZ after stapled IPAA. The results of this study show that the risk of long-term dysplasia remains as low as in the previous report, even with an additional five years of follow-up. Furthermore, when dysplasia is low grade, it does not appear to be progressive. However, dysplasia may develop after a long postoperative interval. One patient with high-risk preoperative risk factors developed HGD in the ATZ 123 months after the original surgery.

The incidence of ATZ dysplasia in the present study is 4.5 percent. The incidence of focal dysplasia in the preserved ATZ in different studies varies (0–16 percent).<sup>12–15</sup> The variable incidence of dysplasia in other studies may be attributed to longer follow-up

and less rigid patient selection criteria with respect to preoperative risk factors for stapled anastomosis in our institution. Variation of pathologic review has also been a focus of discrepancy in dysplasia reading.<sup>16</sup> For this reason, two experienced pathologists with a special interest in inflammatory bowel disease reviewed all dysplasia results independently. Two ATZ biopsy results with dysplasia were excluded from the study after independent review by study pathologists. Neither patient had associated risk factors.

In the present study, five of eight patients who developed ATZ dysplasia had preoperative risk factors. This also supports the assertion that these are cases of true dysplasia. It has been the practice at our institution that no patient with a known preoperative diagnosis of carcinoma of the rectum or of dysplasia within 8 cm of the anal verge is considered for stapled IPAA; instead, such patients undergo mucosectomy and handsewn anastomosis. We do consider it safe to do a stapled anastomosis with ATZ preservation in patients with the preoperative risk factor of colonic dysplasia. In the present study, there was a significant association of preoperative colorectal dysplasia in patients with ATZ dysplasia ( $n = 8$ ) that was not apparent in our previous study ( $n = 7$ ). However, the small number of cases of ATZ dysplasia and more focused, longer follow-up of our earliest patients with stapled pouch procedures of more than ten years' duration may explain this. In addition, two ATZ dysplasia patients in the present study are different from those in the previous study. One patient in the previous study was not included in the present study because his surgery was performed fewer than ten years ago. This patient did have LGD and has been under surveillance without any progression for more than seven years. One recently diagnosed case and one previously unknown result were added to the present study group. One of the two who were included in the present study did have preoperative risk factors for ATZ dysplasia. This explains the statistically significant difference we had in the present study compared with the previous study.

A stapled IPAA in patients with preoperative colonic or upper rectal dysplasia is still recommended at this institution. We believe this is safe given our current knowledge of dysplasia. Whether LGD always progresses to HGD and cancer or is a variant of an inflammatory process has not been resolved. Woolrich *et al.*<sup>17</sup> found that 15 of 22 patients with LGD in the colon or rectum showed no dysplasia on the second surveillance examination. This distinction is

particularly important in the case of dysplasia of the ATZ, and this situation is also seen elsewhere in the body.<sup>18</sup> If LGD always progresses into cancer, then the risk of eventual ATZ cancer would be very high in our affected patients. On the other hand, if it is simply a marker of cancer risk elsewhere (and indeed, 5 of the 8 patients in the present study with ATZ dysplasia had a history of colorectal dysplasia or cancer), then this risk should have been substantially reduced by removal of the colon and rectum. Because we have now doubled the median follow-up to 120 months and no patient has developed cancer, it would appear that the risk of cancer with ATZ dysplasia is not high. However, it is prudent to be cautious. For instance, Woolrich *et al.*<sup>17</sup> demonstrated the development of carcinoma up to nine years after the first documentation of LGD. This is also supported by our recent finding of HGD ten years after surgery.

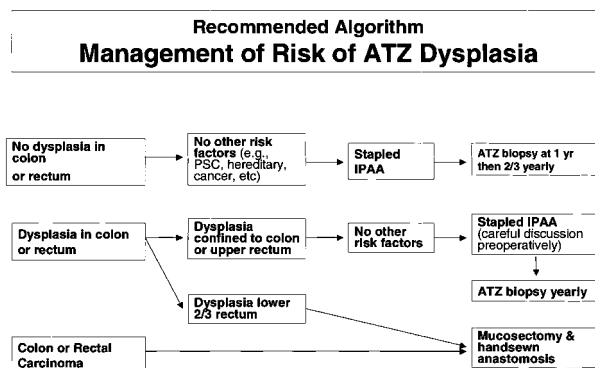
The present study suggests that there is an association between dysplasia in the ATZ and a preoperative diagnosis of dysplasia or cancer ( $P = 0.002$ ) in patients with mucosal ulcerative colitis. The question might be raised whether we should have changed our practice and performed mucosectomy in all patients with known colonic dysplasia, because our data support the association of preoperative colonic dysplasia with subsequent ATZ dysplasia occurrence. The number of patients with dysplasia in the ATZ was small, so we must be careful in drawing definitive conclusions based on these data. However, we are unable to justify mucosectomy for the sake of a 19 percent incidence of dysplasia over a 10-year period, without any subsequent cancer development and pouch loss over 10 years, and give up the better functional outcome associated with stapled anastomosis.<sup>6</sup> Certainly, a clear tendency to develop dysplasia exists in patients with mucosal ulcerative colitis who have a preoperative diagnosis of dysplasia or cancer. The same tendency to develop dysplasia was shown in patients with a postoperative pathologic diagnosis of dysplasia or cancer in the resected excision specimen (Table 3).

Although LGD and HGD of the ATZ are situations that warrant careful observation and monitoring, our current recommendations have not changed. We do recommend multiple biopsies at intervals of three to six months and excision of the anal canal should HGD persist. Although the efficacy of surveillance in LGD is unproved, it would appear reasonable to biopsy these patients at intervals of three to six months. If apparent regression of dysplasia is seen, yearly biopsies are

recommended thereafter. Mucosectomy and perineal pouch advancement are recommended for patients with persistent LGD after three consecutive ATZ biopsies. Our current practice and the management of ATZ dysplasia are summarized in Figure 1. Nonetheless, because of the clear tendency to develop dysplasia with a history of cancer or dysplasia, these patients should be surveyed particularly carefully. Our current protocol for surveillance of patients without a prior history of colorectal cancer or dysplasia of the ATZ is to perform annual biopsy the first year and every two to three years thereafter.

Although stapled anastomosis with ATZ preservation has been the focus of risk of neoplasia, four of the seven described cases of adenocarcinoma arising at the IPAA have been in those who had undergone mucosectomy.<sup>19-25</sup> In one report, the type of anastomosis was not stated.<sup>21</sup> The answer may relate to the longevity of the follow-up and the number of patients in each group. It is likely that diseased epithelium was left behind by incomplete mucosectomy. Thus, mucosectomy with a handsewn anastomosis may give a false sense of security compared with stapled anastomosis, where good visualization and biopsy of the ATZ can be performed. Of the two reported patients with ATZ cancer after a stapled anastomosis, one was known to have rectal cancer before IPAA.<sup>23,24</sup> In addition, the recent report of the malignant potential of the pouch mucosa itself does not eliminate the need for pouch surveillance.<sup>26</sup>

Although dysplasia raises a concern for further cancer development, there is also concern about reliance on random biopsies for surveillance since Taylor *et al.*<sup>27</sup> showed 26 percent of cancer occurrence without any coexisting findings of dysplasia in proctocolectomy specimens. We believe the present patient pop-



**Figure 2.** Management of risk of anal transitional zone (ATZ) dysplasia. PSC = primary sclerosing cholangitis; IPAA = ileal pouch-anal anastomosis.

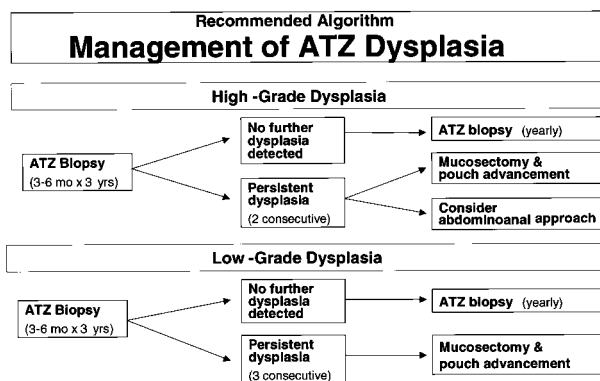
ulation may provide an opportunity to study the natural history and progression of dysplasia in inflammatory bowel disease, because the limited area at risk eliminates such issues as sampling error when the entire colon is being evaluated.

### CONCLUSIONS

We currently do not recommend ATZ preservation in patients with a known diagnosis of rectal cancer or dysplasia in the lower two-thirds of the rectum before IPAA surgery. Our current recommendation for the management of risk of ATZ dysplasia and the selection of type of anastomosis to be used in creation of the IPAA is summarized in Figure 2. ATZ preservation appears to be safe for patients with dysplasia of the colon or the upper one-third of the rectum provided that they participate in a regular program of follow-up. We also give the option of a stapled anastomosis to obese, elderly patients or patients with poor sphincter pressures with the presence of mid and low rectal dysplasia, where mucosectomy and handsewn anastomosis will not be feasible because of reach or poor function.

Longer follow-up will be needed to more accurately quantify the risks of anal canal dysplasia/cancer after restorative proctocolectomy with anal canal preservation. Likewise, recommendations for surveillance intervals stratified by precolectomy/postcolectomy risk factors will likely become more robust with longer follow-up.

The risk of anal transitional cancer is low after ATZ preservation and in our opinion is outweighed by the benefits of retaining the ATZ. The finding of dysplasia in the ATZ does not jeopardize pouch retention. The



**Figure 1.** Management of anal transitional zone (ATZ) dysplasia.

present study reports the longest follow-up to date. Continued regular surveillance is recommended.

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