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**Original Research Article**

# A comparative study of standard versus extralevator abdominoperineal resections

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## ABSTRACT

**Background:** The aim was to compare short term outcomes between patients undergoing standard abdominoperineal resection (APR) with those that had an extralevator abdominoperineal excision (ELAPE).
**Methods:** A retrospective study was done on 123 consecutive patients who underwent an abdominoperineal resection for low rectal cancer at the Townsville hospital between August 2003 and January 2015. Data was collected from medical records. Short term oncological outcomes were compared between the APR and ELAPE group.
**Results:** The circumferential resection margin (CRM) involvement rate was significantly lower in the ELAPE group 13.2% versus 19.3% in the APR group. The local recurrence rates in the two groups were not significantly different: 16.8% in the ELAPE versus 17.4% in the APR group. Intraoperative perforations were lower in the ELAPE group 15.3% versus 23.2 % in the APR group. The post-operative wound infection rate was however higher in the ELAPE group 20.3% versus 12.4 % in the APR group.
**Conclusions:** ELAPE was shown to be superior in the CRM and intraoperative perforation rate but the local recurrence rates were similar. ELAPE had a higher wound complication rate than APR.

**Keywords:** Abdominoperineal resection, Extralevator abdominoperineal resections, Outcomes

## INTRODUCTION

The colorectal cancer world burden is on the increase with at least two million new cases and over a million deaths expected by the year 2030.[1] For low rectal cancers involving the sphincters, abdominoperineal resection (APR) remains a viable option.[2] The standard abdominoperineal resection an operation described by Miles was for many years the gold standard for distal rectal cancers in whom an anterior resection cannot be performed.[3] With the introduction of total mesorectal excision (TME) as the optimal technique for rectal cancer resection, oncological outcomes have generally improved.[3] The improvements in surgical techniques has also seen pelvic autonomic nerve preservation increasing in importance. However, in comparison to anterior resections the improvement in results after APR has not been as good. Holm et al then introduced the extralevator abdominoperineal resection (ELAPE).[4] The ELAPE procedure creates a cylindrical specimen without a "waist" unlike a standard APR.[5,6] This technique aims to reduce local recurrence, positive circumferential margins and intraoperative perforation amongst other complications which impact on short and long term prognosis of patients.[7,8]

The ELAPE procedure creates a cylindrical specimen without a waist so as to minimize the risk of tumor involvement. This operation however tends to be longer, leaves a larger perineal defect often difficult to deal with

and has a higher complication rate.[9] This may require the involvement of a plastics/reconstructive surgery team. Our study was specifically looking at the circumferential resection margin rate (CRM), the local recurrence rates as well as intraoperative perforations rates so as to make an opinion on whether the longer, more complicated operation with potentially higher rates of morbidity is justified.

## METHODS

A retrospective analysis of all patients who had an abdominoperineal resection was carried out at the Townsville hospital, a tertiary teaching hospital. The study period was August 2003 to January 2015. The data was obtained from clinical records and from the department of pathology.

The patient inclusion criteria were all patients who underwent the standard abdominoperineal resection APE and extralevator abdominoperineal resection ELAPE and had adequate follow up by the surgical team. Recorded information included demographic details, operation technique (laparoscopy vs open), blood loss, histological type of cancer, grade, stage, length of surgery, recurrence rates, complications and whether prophylactic mesh was used or not. The data was recorded on a Microsoft excel spread sheet.

Statistical analysis was done using IBM SPSS software.

## RESULTS

### *Demographics*

Demographic and clinical characteristics of the subjects are shown in the tables below. The total number of subjects are N = 123. Majority of the subjects were male (n = 72, 58.5%) compared to 51 (41.5%) women. The average age of the subjects as of 15th February 2015, is 67.06 years (SD = 11.47), average weight at the time of surgery is 86.23 kilograms (SD = 18.21), and average BMI 31.21 (SD = 4.4).

### *Demographic and clinical characteristics of subjects*

**Table 1: Gender.**

| Gender | ELAPE | Standard APR | Total |
|---|---|---|---|
| Male | 35 | 37 | 72 (58.5%) |
| Female | 30 | 21 | 51 (41.5%) |

**Table 2: Histology.**

| Adenocarcinoma | 89 (72.3%) |
|---|---|
| Squamous cell carcinoma | 17 (13.8%) |
| Ulcerative colitis | 10 (8.1%) |
| Other | 7 (5.7%) |

**Table 3: Technique (open vs laparoscopic).**

| Technique | ELAPE | Standard APR | Total |
|---|---|---|---|
| Open | 26 (21.1%) | 31 (25.2%) | 57 (46.3%) |
| laparoscopic | 39 (31.7%) | 27 (21.9%) | 66 (53.7%) |

**Table 4: Technique (ELAPE vs Standard APR).**

| Standard APR | 58 (47.2%) |
|---|---|
| ELAPE | 65 (52.9%) |

**Table 5: Local recurrence rates.**

| Standard APR | 11/65 (16.8%) |
|---|---|
| ELAPE | 10/58 (17.4%) |

**Table 6: Positive circumferential resection margin rate.**

| Standard APR | 11/58 (19.3 %) |
|---|---|
| ELAPE | 9/65 (13.2%) |

**Table 7: Post-operative wound infection rates.**

| Standard APR | 7/58 (12.4%) |
|---|---|
| ELAPE | 13/65 (20.3%) |

**Table 8: Demographic and clinical characteristics of subjects.**

| Characteristic | Mean | Standard deviation |
|---|---|---|
| Age (years) | 67.06 | 11.47 |
| Weight (kg) | 86.23 | 18.21 |
| BMI (kg/m$^2$) | 31.21 | 4.40 |
| Distance Anal verge (cm) | 2.32 | 1.21 |
| Blood loss (ml) | 185.32 | 47.23 |
| Duration of surgery (mins) | 152.63 | 49.19 |
| Radial margin (mm) | 1.3 | 0.25 |
| Hospital stay (days) | 9.48 | 7.07 |

A vast majority (n = 89, 72.3%) of the subjects were treated for Adenocarcinoma. The balance of the subjects were treated for Squamous Cell Carcinoma, Ulcerative Colitis and Other ailments. Out of the subjects who underwent surgery, the majority (n = 66, 53.7%) underwent laparoscopic surgery, and the balance (n = 57, 46.3%) underwent open surgery. The average surgery time was 152.63 minutes (SD = 49.19) and the subjects' hospital stay averaged 9.48 days (SD = 7.07). The average distance from the anal verge was 2.32 centimeters (SD = 1.21), the average radial margin was 1.3 millimeters (SD = 0.25), and the average blood loss during surgery was 173.35 milliliters (SD = 47.23). The positive circumferential resection margin rate was 13.2% in the ELAPE group compared to 19.3 % in APR group. The local recurrence rates were not significantly

different. 16.8% in the ELAPE group versus 17.4% in the APR group. Intraoperative perforations were lower in the ELAPE group 15.3% versus 23.2% in the APR group. The post-operative wound infection rate was higher in the ELAPE group 20.3% versus 12.4% in the APR group.

## DISCUSSION

### *Circumferential resection margins*

After radical resection of rectal carcinoma, the circumferential resection margin (CRM) is of critical importance. The CRM status is an important predictor of local and distant rectal metastasis.[10] In the event of positive CRM, neoadjuvant radiotherapy is indicated. In our study, The ELAPE procedure significantly improved the CRM margin involvement, 13.2% versus 19.3%. With the CRM being an independent prognostic indicator in colorectal surgery, ELAPE becomes a superior surgical technique to standard APR if these results are to be replicated in other studies.

Despite the CRM involvement rates being significantly different in the groups above, it was worth noting the local recurrence rates were not significantly different. The standard APR group did marginally better than the EALPE group, 16.8% versus 17.4%. The local recurrence rates is however affected by other factors in addition to the CRM involvement rate. These factors include the grade and stage of the tumor, fixity to other viscus and perforation rates.[11] The wound infection rate in the ELAPE group was higher, 20.3% versus 12.4%. This is likely explained by the ELAPE wound being larger and sometimes needing plastics and reconstructive surgery team involvement. The surgical time with ELAPE is also longer as expected and hence an increase in post-operative wound infections. A higher post-operative wound infection rate is likely to be acceptable to surgeons and patients if the oncological results are significantly better.

## CONCLUSION

The circumferential resection margin rates were significantly improved by the ELAPE procedure despite the local recurrence rates and wound infection rates being higher. It will be interesting to compare the long term outcomes including five year survival rates and distant metastasis. Multicenter studies are necessary to validate these findings.

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