

Comparative analysis of short term and long term outcomes of McKeown versus Ivor Lewis esophagectomy in Lower Esophageal Squamous cell carcinoma

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Introduction

Esophageal cancer is the eighth most common cancer worldwide and the sixth leading cause of cancer-related deaths, with a five-year survival rate typically ranging from 10% to 30%. The main subtypes are adenocarcinoma and squamous cell carcinoma (SCC), differing in epidemiology and clinical behaviour. Surgical resection, particularly for lower esophageal cancer, includes McKeown esophagectomy (three-incision) and Ivor Lewis esophagectomy (two-incision), with both techniques allowing for thoracic lymph node dissection. This study aims to compare the short-term and long-term outcomes of McKeown versus Ivor Lewis esophagectomy in patients with lower esophageal SCC to determine the better surgical option..

Material and Methods

Data Collection: Surgical data from January 2017 to March 2024 for lower esophageal SCC patients were analysed. Patient Evaluation: Diagnoses were confirmed via upper GI endoscopy with biopsy, and staging was done with CT or PET-CT scans. Treatment Protocol: Patients received neoadjuvant therapy with chemoradiotherapy or chemotherapy, commonly using CDDP + 5FU and paclitaxel + carboplatin regimens. Postoperative adjuvant treatment was given based on nodal involvement. Surgical Approaches: McKeown and Ivor Lewis procedures were used, depending on tumor resection needs and surgeon preference, both involving standard two-field lymphadenectomy. Techniques: General anaesthesia and double-lumen endotracheal tube were used. The McKeown procedure included neck anastomosis, while the Ivor Lewis involved thoracic anastomosis.

Result

The clinical profiles and baseline characteristics of patients undergoing Ivor Lewis (IVL) and McKeown (TTE) esophagectomy for lower esophageal squamous cell carcinoma were similar. Mean age, gender distribution, addiction rates, dysphagia incidence, symptom duration, ECOG status, endoscopic non-negotiability, and histology were comparable. IVL had more stapled anastomoses (p = 0.03).

Intraoperative blood loss, ICU stay, involved and harvested nodes, adjuvant therapy rates, and recurrence rates showed no significant differences.

Complication rates were minimal. Multivariate analysis indicated gross tumor features significantly impacted TTE outcomes (p = 0.016).

For IVL, shorter lengths correlated with better outcomes (p = 0.018), while other factors were not significant. There was no significant difference in perioperative mortality between McKeown and Ivor Lewis groups (p=0.58).

Median DFS and OS for McKeown were 60 and 50 months, respectively, while DFS for Ivor Lewis was not reached. Five-year OS rates were 53.08% and 59.13%, and DFS rates were 35% and 32.01%, respectively.

Table-2 Showing type of management, and histological outcomes

Sl No	Parameters	IVL(n=45)	TTE(n=55)	Total(n=100)	p value
1	Treatment plan Upfront surgery NACT NACTRT	8 (17.77%) 26 (57.77%) 11 (24.44%)	10 (18.18%) 35 (63.63%) 10(18.18%)	18(18%) 61(61%) 21(21%)	0.13
2	Anastomotic method Stapled Hand sewn	40(88.88%) 05(11.12%)	35(63.63%) 20(36.37%)	75(75%) 25(25%)	0.03
3	Intraoperative blood loss Mean(ml)	342.72±142.04	312.5±170.54	327.61±156.29	0.354
4	Average ICU stay (days)	1.74±1.04	1.64±0.81	1.69±0.92	0.66
5	Pathological node involvement Mean	1.6	1.03	1.31	0.17
6	Number of node harvested Mean	17.2	17.6	17.4	0.51
7	Adjuvant Treatment Chemoradiotherapy Chemotherapy	7 (15.55%) 2 (4.4%)	8(14.54%) 1 (1.81%)	(15%) 3 (3%)	0.33
8	Recurrence	13(28.88%)	14(25.45%)	17(17%)	0.82

Table-3 Showing the complications related to the surgical procedure

SL NO	Complication	IVL(n=45)	TTE(n=55)	Total(n=100)
1	Pneumonia	0(0%)	1(1.81%)	1(1%)
2	pleural effusion	0(0%)	0(0%)	0(0%)
3	pneumothorax	0(0%)	0(0%)	0(0%)
4	anastomotic leak	0((0%)	2(2.1%)	2(2%)
5	vocal cord paralysis	0(0%)	0(0%)	0(0%)
6	chyle leak	0(0%)	1(1.81%)	1(1%)
7	hypertension	2(4.44%)	0(0%)	2(2%)
8	surgical emphysema	0(0%)	1(1.81%)	1(1%)

Table-1 Showing clinical profile and baseline characteristics of the patients

Sl No	Parameters	IVL(n=45)	TTE(n=55)	Total(n=100)	p value
1	Age Mean(years)	51.36±8.30	52.95±12.12	52.15±10.21	0.341
2	Sex Male Female	28(62.22%) 17(37.78%)	36(65.45%) 19(34.55%)	64 (64%) 36 (36%)	0.38
3	Addiction Smoking Tobacco Chewing Alcohol	06(13.33%) 02(4.44%) 00(00%)	09(16.36%) 09(16.36%) 06(10.90%)	18(18%) 11(11%) 06(6%)	0.19
4	Symptoms Dysphagia Vomiting Cough	43(95.55%) 05(11.11%) 01(2.22%)	52(94.54%) 07(12.72%) 01(3.63%)	95(95%) 12(12%) 02(02%)	0.51
5	Duration of symptoms Mean(Months)	4.47±2.78	3.90 ±2.70	4.18±2.74	0.487
6	ECOG 1 2	40(88.88%) 05(11.12%)	50(90.90%) 05(09.10%)	90(90%) 10(10%)	0.40
7	Endoscopic non- negotiability	16(35.55%)	17(30.90%)	33(33%)	0.79
8	Involvement of GE Junction Involvement of stomach	11(24.44%) 11(24.44%)	02(3.63%) 02(3.63%)	13(13%) 13(13%)	
9	Extrac-esophageal involvement	14(31.11%)	13(23.63%)	27(27%)	0.79
10	Nodal involvement(On imaging) Mediastinal Abdominal Cervical	16(35.55%) 09(20%) 00(00%)	12(21.81%) 07(12.72%) 02(03.63%)	28(28%) 16(16%) 02(02%)	0.87

Table-4 Showing multivariate analysis of TTE group outcome with variables

Variable	Adjusted Ratio	95% Confidence Interval	p-value
AGE	1.15	0.92 - 1.45	0.328
LENGTH	1.29	0.97 - 1.72	0.078
SEX	1.44	0.79 - 2.63	0.234
ICU	1.12	0.68 - 1.83	0.633
GROSS TUMOR	1.87	1.13 - 3.08	0.016
NODEINVOLVED	1.02	0.77 - 1.34	0.84
NODEHARVESTED	1.03	0.72 - 1.48	0.371
LVI	1.42	0.95 - 2.11	0.082
PNI	1.28	0.74 - 2.19	0.367
STAGE	1.18	0.92 - 1.50	0.164

Table 5: Showing multivariate analysis of IVL group outcome with variables

Variable	Adjusted R Squared	95% Confidence Interval	P Value
AGE	1.1	0.91 - 1.39	0.27
LENGTH	1.19	0.87 - 1.60	0.018
SEX	1.44	0.79 - 2.63	0.234
ICU	1.02	0.59 - 1.13	0.53
GROSS TUMOR	0.488	[0.549- 0.305]	0.5
NODEINVOLVED	1.01	0.74 - 1.14	0.84
NODEHARVESTED	1.04	0.70 - 1.31	0.371
PNI	0.565	[0.504- 0.126]	0.565
STAGE	0.73	[0.000 - 0.303]	0.73

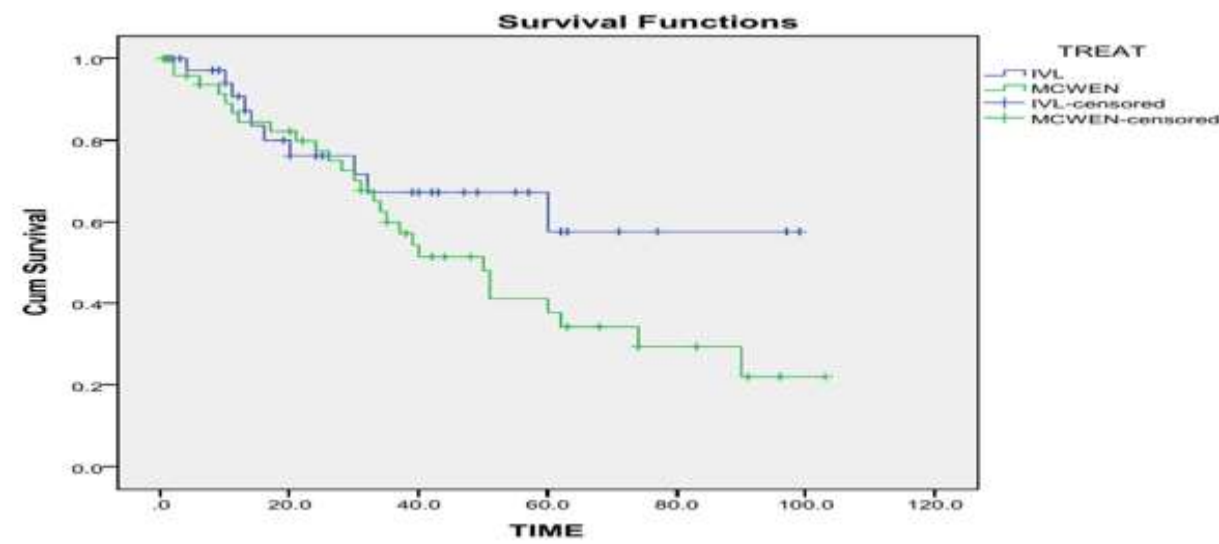


Figure 1: Kaplan Meier curve showing five-year overall survival between McKeown and Ivor-Lewis procedures

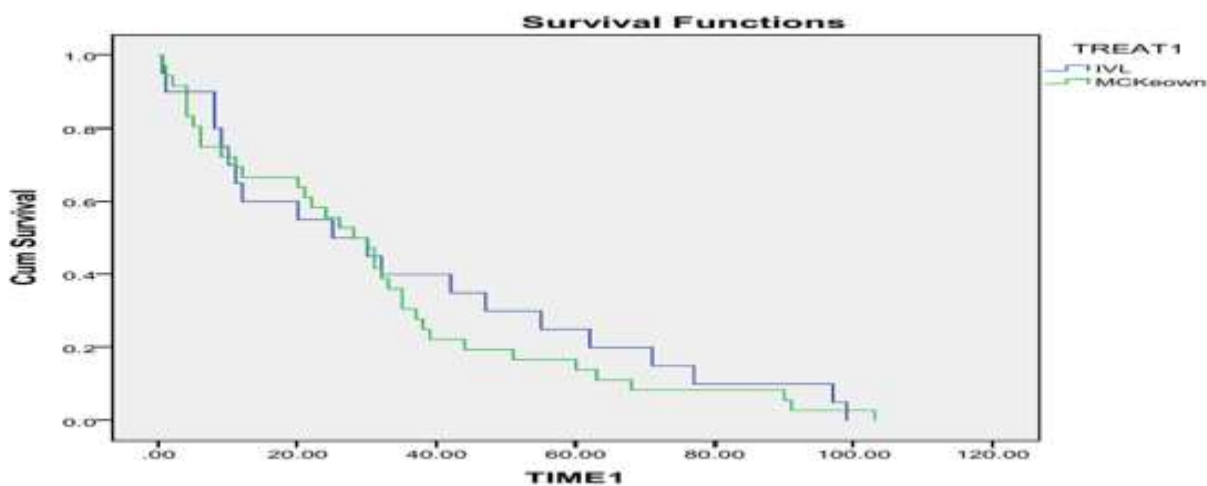


Figure 2: Kaplan Meier curve showing five-year disease-free survival between McKeown and Ivor-Lewis procedures

Discussion

Over the past decade, the application of neo-adjuvant therapy has significantly enhanced survival rates for esophageal cancer, with surgical intervention remaining a cornerstone of treatment. The Ivor Lewis esophagectomy, particularly indicated for tumors located in the lower esophagus and gastroesophageal junction, is associated with a lower incidence of complications such as anastomotic leakage and recurrent laryngeal nerve injury compared to the transhiatal esophagectomy (TTE). Pulmonary complications were comparable between the procedures, with an overall incidence of 7%. However, anastomotic leaks were more prevalent in patients undergoing the McKeown esophagectomy, which also exhibited a higher risk of recurrent laryngeal nerve damage. Both surgical approaches demonstrated similar rates of anastomotic stricture. The predominant pattern of treatment failure was loco-regional recurrence. Key prognostic indicators included nodal involvement and p T stage, with no significant difference in overall survival observed between the two groups.

Conclusions

The Ivor Lewis and McKeown esophagectomy procedures demonstrated comparable baseline characteristics, clinical profiles, management strategies, and postoperative complications. There were no significant differences in perioperative mortality or long-term survival outcomes between the two approaches. The selection of the surgical technique should be individualized, taking into consideration the specific patient characteristics and tumor features. Further research is warranted to refine these findings.