ISSN: 2581 – 3633
PubMed - National Library of Medicine - ID: 101745081

International Journal of Medical Science and Advanced Clinical Research (IJMACR)

Available Online at:www.ijmacr.com

Volume – 8, Issue – 4, July - 2025, Page No.: 51 – 56

The Burning Issue: Evaluation of Electrosurgical Issues in Surgeries

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How to citation this article: Dr. Laxmi Halemani, Dr. Gopinath Pai, Dr. Ranjith K. B, Dr. Nikhil N. G, "The Burning Issue: Evaluation of Electrosurgical Issues in Surgeries", IJMACR- July - 2025, Volume – 8, Issue - 4, P. No. 51 – 56.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Aims and Objectives

This study aims at

1. To assess the evaluation of electrosurgical issues in patients undergoing surgeries.
2. To educate the need for preventive measures and ensure implementation.

Methods

- Observational study carried out in KVGMCH with study duration of 6 months.
- A checklist was prepared keeping in mind the common fallacies in Operation theatres
- Using the above checklist, assessment regarding the cautery pad burns and its effects on patients, surgeon burns, arrhythmias noted in ECG monitors were documented.
- The data was analysed and conclusions drawn.

Results: A total of 60 cases were observed (35 major cases and 25 minor cases), out of which the following observations were noted:

N=60	Issues in question	No. of Cases Observed	Reason	Measure(s) taken	Final Outcome
	Incidence of Cautery pad burns	2	Inappropriate size of cautery plate	N/A	N/A
	Incidence of Arrhythmias on ECG Monitors Intra-op	5	Inappropriate Size of Cautery plate	Changing Cautery plate	Issue Resolved
	Incidence of Surgeon Burns	Nil	-	-	-
	Incidence of Surgical Fires	Nil	-	-	-

Conclusion

- Knowledge of the Fire triad: Electrocautery, Surgical Burns and Alcohol prep solution and Drapes
- Increasing incidence of electrosurgical burns in OT is a cause for major concern and appropriate steps need to be taken to reduce the same.
- Institutional awareness is low, and printed protocols are required to be kept and subsequent evacuation plans in case of cautery fire is required.
- Accordingly the use of risk assessment tools in all surgical interventions needs to become an organizational culture and operating room staff needs to be trained on the risks and precautions concerning fire.
- Further studies comprising a large sample will contribute to the understanding and solidify the evidence.

Keywords: Electrosurgical, Electrocautery, Wet Surfaces, Cautery Plate

Introduction

Electrosurgical instruments are one of the useful and most used instruments within the surgeon's armamentarium, yet their utilization carries inherent risks due to the generation of electrical current and heat.

These complications, often underreported, can lead to morbidity and associated medicolegal and economic consequences.

Wound healing complications, infections, and prolonged treatment can result in physical, financial and psychological impacts on patients and their families.

Objectives of the Study

1. To observe the incidence of electrosurgical issues in Surgery.
2. To evaluate the various technical aspects involved in setting up of electrosurgical unit in OT
3. To analyze the results and formulate an effective method to overcome the same.

Materials and Methods

Place of Study: K.V.G Medical College and Hospital, Sullia.

Setting: Operation Theatre

Study Design: Prospective Observational study

Period of Study: 8 months (March 2024 – September 2024)

Study Population: Observing the Major and minor surgeries performed at KVG Medical College and Hospital, Sullia.

Inclusion Criteria

- All major procedures involving GA or SA.
- Surgeries where ESU was utilized.

Exclusion Criteria

- OTs with time duration of <30 mins.
- Surgeries where ESU was not utilized.
- Minor Procedures performed under LA.

Sample Size

- A total of 60 procedures were observed over the duration of study period and results obtained were analysed.

Methodology

The present study was conducted in OT setting at K.V.G. Medical College and Hospital, Sullia, D.K

The Study was carried out for a period of 8 Months. Written informed consent was not taken as this was a purely observational study and no active intervention was needed. A Checklist was kept in place and results so obtained were analyzed and conclusions were drawn.

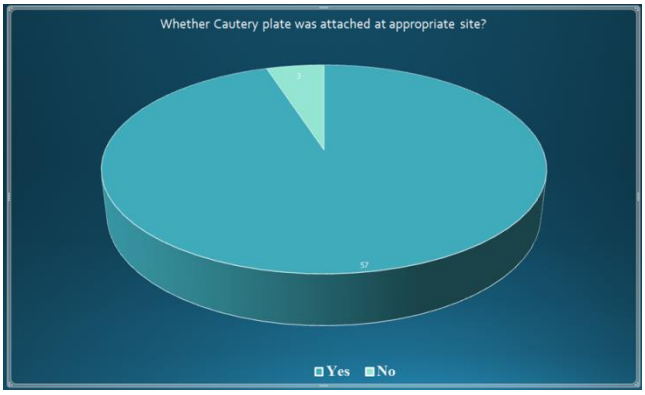
Statistical Analysis: The data was entered in Microsoft Office Excel 2021 and IBM SPSS version 29 was used

for analysis. The data is presented in the form of tables and figure. The data is represented as bar diagram, pie chart, frequencies, percentages, mean and standard deviation.

Checklist

1. Whether cautery plate is attached on the appropriate site?
2. Whether appropriate size of cautery plate is used?
3. Whether the gel has been applied or not, if yes, whether is it adequate or not?
4. Distance of cautery pad from operating area
5. Use of monopolar vs bipolar cautery?
6. Whether fluid was allowed to collect on the OT table below patient?
7. Whether the device is checked before the surgery and if any error is observed is it replaced or not?
8. Whether ESU was in close proximity to oxygen or flammable substances?
9. Whether cable is wrapped around metal instruments?
10. Whether surgeon burns were reported?, if yes, usage of wet gloves/ surgical field or torn gloves were observed or wet foot pad / wet surfaces?
11. Whether any incident of surgical fire and burns occurred in the operating room?
12. Whether Anaesthesia team reported of Arrhythmias on ECG monitor while using ESU intra-operatively?

Graph 1:



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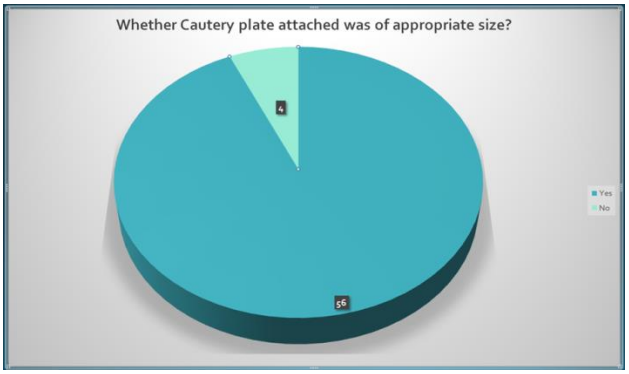

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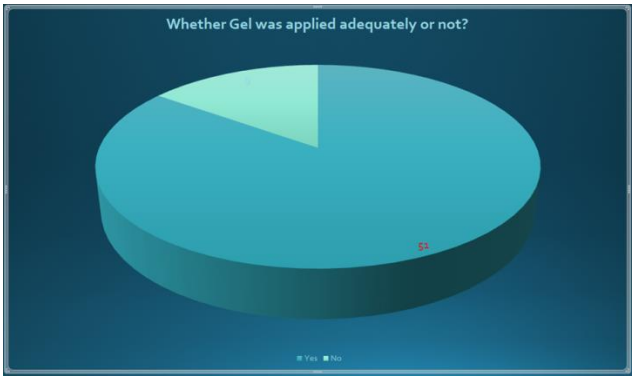

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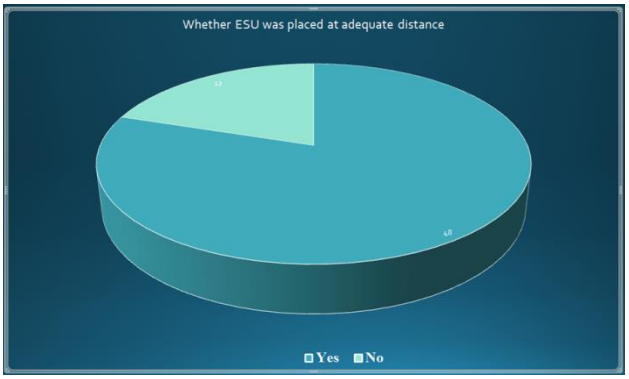

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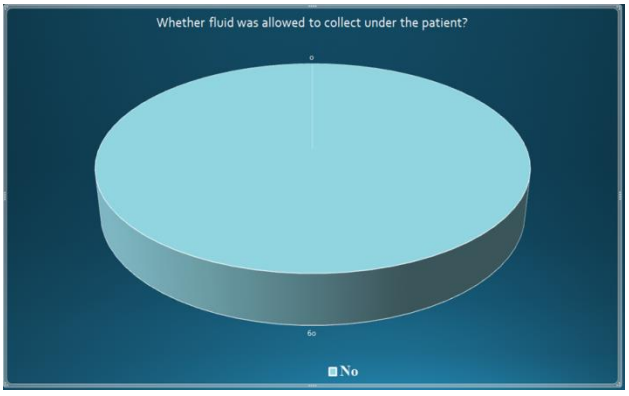

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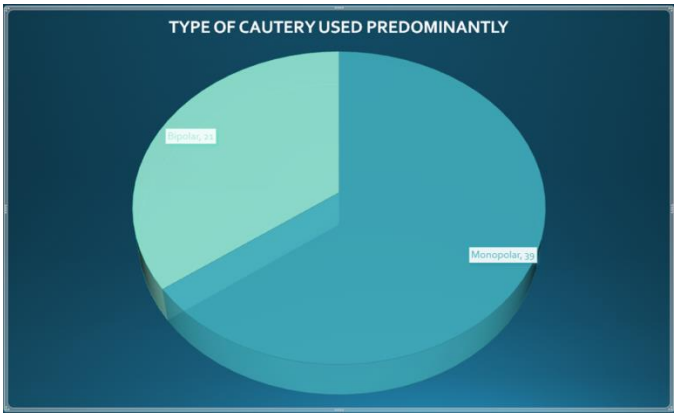

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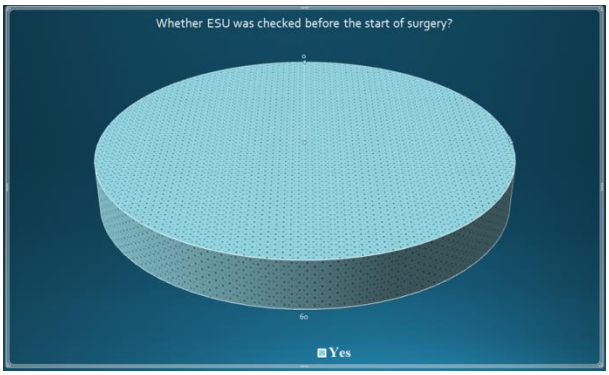

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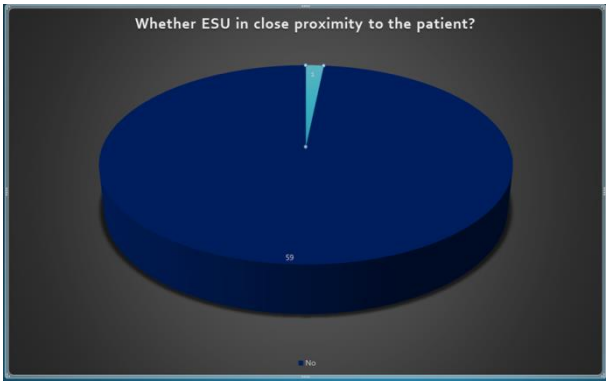

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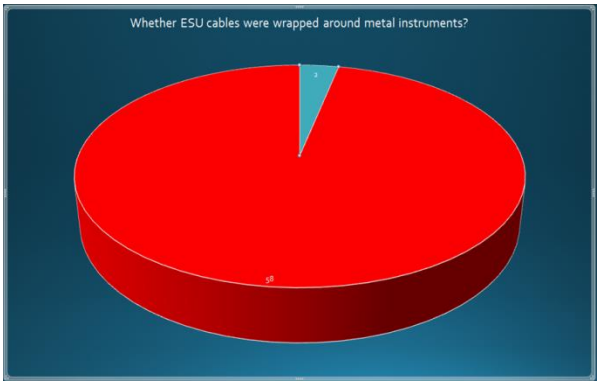

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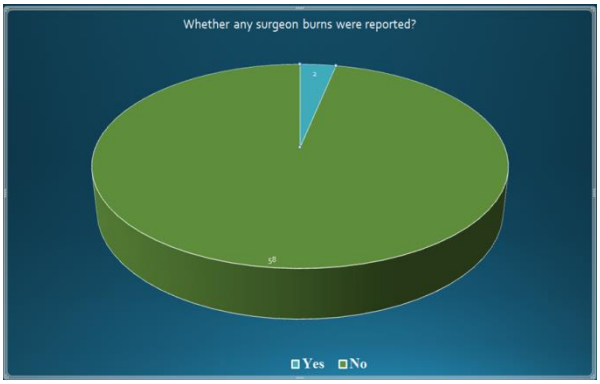

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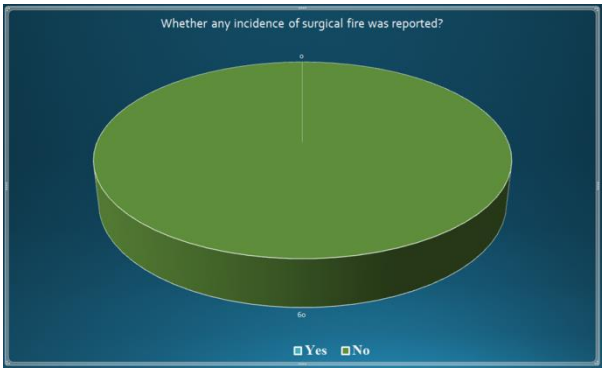

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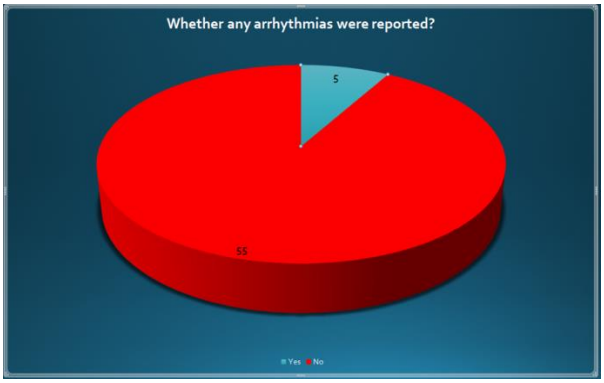

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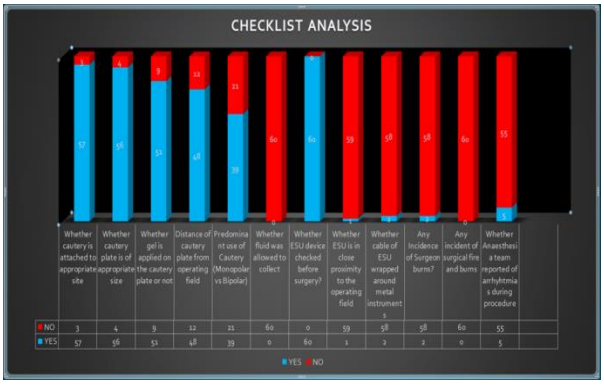

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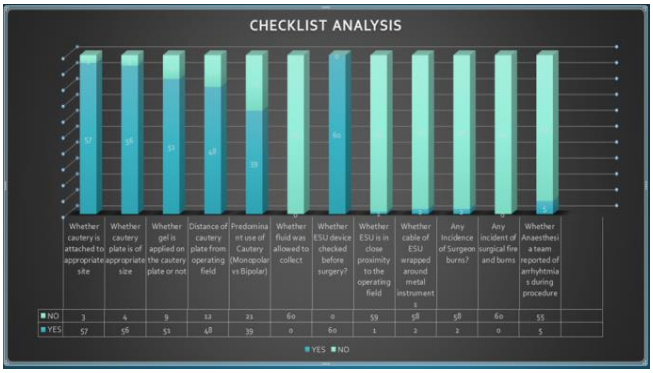

Symmetric Measures

V7			Value	Approx. Sig.
B	Nominal by Nominal	Phi	.[c]	
	N of Valid Cases		21	
M	Nominal by Nominal	Phi	.038	.814
		Cramer's V	.038	.814
	N of Valid Cases		39	
Total	Nominal by Nominal	Phi	.050	.701
		Cramer's V	.050	.701
	N of Valid Cases		60	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. No statistics are computed because V12 is a constant.

Monopolar had more burns

Chi-Square Tests

V7		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
B	Pearson Chi-Square	.[c]				
	N of Valid Cases	21				
M	Pearson Chi-Square	9.637[d]	1	.002		
	Continuity Correction[b]	4.659	1	.031		
	Likelihood Ratio	7.402	1	.007		
	Fisher's Exact Test				.028	.028
	N of Valid Cases	39				
Total	Pearson Chi-Square	11.724[a]	1	.001		
	Continuity Correction[b]	5.842	1	.016		
	Likelihood Ratio	8.003	1	.005		
	Fisher's Exact Test				.020	.020
	N of Valid Cases	60				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .30.

b. Computed only for a 2x2 table

c. No statistics are computed because V12 is a constant.

d. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .36.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	11.724[a]	1	.001		
Continuity Correction[b]	5.842	1	.016		
Likelihood Ratio	8.003	1	.005		
Fisher's Exact Test				.020	.020
N of Valid Cases	60				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .30.

b. Computed only for a 2x2 table

Gel applied vs burns

Chi-Square Tests

V4		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
N	Pearson Chi-Square	.[c]				
	N of Valid Cases	4				
Y	Pearson Chi-Square	10.831[d]	1	.001		
	Continuity Correction[b]	5.340	1	.021		
	Likelihood Ratio	7.722	1	.005		
	Fisher's Exact Test				.023	.023
	N of Valid Cases	56				
Total	Pearson Chi-Square	11.724[a]	1	.001		
	Continuity Correction[b]	5.842	1	.016		
	Likelihood Ratio	8.003	1	.005		
	Fisher's Exact Test				.020	.020
	N of Valid Cases	60				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .30.

b. Computed only for a 2x2 table

c. No statistics are computed because V5 and V12 are constants.

d. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .32.

Appropriate size vs burns

Chi-Square Tests

V3		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
N	Pearson Chi-Square	.[c]				
	N of Valid Cases	3				
Y	Pearson Chi-Square	11.055[d]	1	.001		
	Continuity Correction[b]	5.465	1	.019		
	Likelihood Ratio	7.794	1	.005		
	Fisher's Exact Test				.023	.023
	N of Valid Cases	57				
Total	Pearson Chi-Square	11.724[a]	1	.001		
	Continuity Correction[b]	5.842	1	.016		
	Likelihood Ratio	8.003	1	.005		
	Fisher's Exact Test				.020	.020
	N of Valid Cases	60				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .30.

b. Computed only for a 2x2 table

c. No statistics are computed because V5 and V12 are constants.

d. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .32.

Cautery attached to appropriate site

Results

The association between usage of adequate gel with incidence of surgical burns was statistically significant. (P = 0.001)

The usage of monopolar cautery had more incidence of and patient burns when compared to bipolar cautery and was statistically significant. (P = 0.038)

The location of cautery plate from the operating field and incidence of surgical burns was found to be statistically significant. (P = 0.001)

The usage of appropriate size of cautery plate was found to be less associated with incidence of surgical burns and was found to be statistically significant. (P = 0.001)

CHECKLIST PARAMETERS	P VALUE	SIGNIFICANT?
Whether cautery is attached to appropriate site?	>0.005	NO
Whether cautery plate is of appropriate size?	0.001	YES
Whether gel is applied on the cautery plate or not?	0.001	YES
Distance of cautery plate from operating field	0.001	YES
Predominant use of Cautery (Monopolar vs Bipolar)	0.038	YES
Whether fluid was allowed to collect?	>0.005	NO
Whether ESU device checked before surgery?	>0.005	NO
Whether ESU is in close proximity to the operating field?	>0.005	NO
Whether cable of ESU wrapped around metal instruments?	>0.005	NO
Any Incidence of Surgeon burns?	0.017	YES
Any incident of surgical fire and burns?	>0.005	NO
Whether Anaesthesia team reported of arrhyhthmias during procedure?	0.021	YES

Discussion

Knowledge of the Fire triad: Electrocautery, Surgical Burns and Alcohol prep solution and Drapes

Increasing incidence of electrosurgical burns in OT is a cause for major concern and appropriate steps need to be taken to reduce the same.

Institutional awareness is low, and printed protocols are required to be kept and subsequent evacuation plans in case of cautery fire is required.

Accordingly the use of risk assessment tools in all surgical interventions needs to become an organizational culture and operating room staff needs to be trained on the risks and precautions concerning fire.

Further studies comprising a large sample will contribute to the understanding and solidify the evidence.

Conclusion

The palpability of superior rectal artery hence can be considered as an important factor in predicting the outcome of progression of hemorrhoidal disease and also helps in taking appropriate steps.

Hemorrhoidal disease if managed appropriately in early stages can limit the progression of the disease and will also reduce the burden of the disease in society.

Further studies in this direction can enhance knowledge in literature and can also bring up effective and efficient solution in treating hemorrhoids.

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