GMR
The Original

SYSTEMATIC REVIEW STUDY OF SAVEETHA UNIVERSAL PRONE FACE REST (SUPFR) VERSUS COMMERCIALLY AVAILABLE FACE REST FOR INCIDENCE OF FACIAL EDEMA AND EASE OF POSITIONING IN PATIENTS UNDERGOING SURGERY UNDER GENERAL ANAESTHESIA IN THE PRONE POSITION

Akilesh Anbalagan*[1], Dr. Pradeep.K[2], Dr. S. Alagendran[3]

[1*]Department of Anaesthesiology, Saveetha Medical College, Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai – 602105, Tamil Nadu, India. ORCID ID Number: 0009-0008-3742-6538, E.Mail: dr.akilesh97@gmail.com
[2]Department of Anaesthesiology, Saveetha Medical College, Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai – 602105, Tamil Nadu, India, Email: drkpradeep@gmail.com
[3]Department of Research, Saveetha College of Nursing (SCON), Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai-602105, Tamil Nadu, India;ORCID ID Number: 0009-0009-0749-7180

ABSTRACT

Background - Prone positioning is frequently required during spinal, neurosurgical, and orthopedic procedures performed under general anaesthesia. However, prolonged prone positioning may result in facial edema, pressure-related skin injuries, ocular complications, and difficulties in maintaining stable head and airway positioning. The Saveetha Universal Prone Face Rest (SUPFR) has been developed as an indigenous, cost-effective positioning device designed to improve facial pressure distribution and facilitate patient positioning. This study compared the efficacy of SUPFR with a commercially available prone face rest.

Objectives: To compare the incidence of facial edema and ease of positioning between the Saveetha Universal Prone Face Rest (SUPFR) and a commercially available prone face rest in patients undergoing surgery under general anaesthesia in the prone position.

Materials and Methods: This prospective comparative observational study was conducted in the Department of Anaesthesiology, Sikkim Manipal Institute of Medical Sciences, Gangtok, over a period of 18 months. Sixty adult patients (ASA physical status I–II) undergoing elective surgery under general anaesthesia in the prone position were enrolled and allocated into two groups: Commercial Face Rest (Group A, n=30) and SUPFR (Group B, n=30). Postoperative facial edema, ocular complications, ease of positioning, endotracheal tube stability, pressure marks, postoperative discomfort, and overall complications were compared. Statistical analysis was performed using SPSS version 27.0, with $p<0.05$ considered statistically significant.

Results: Baseline demographic and perioperative characteristics were comparable between the two groups ($p>0.05$). The incidence of periorbital edema (13.3% vs. 36.7%; p=0.032), conjunctival edema (10.0% vs. 33.3%; p=0.028), conjunctival congestion (16.7% vs. 40.0%; p=0.041), facial edema (10.0% vs. 30.0%; p=0.041), pressure marks (6.7% vs. 33.3%; p=0.009), postoperative discomfort (10.0% vs. 26.7%; p=0.048), and overall complications (16.7% vs. 43.3%; p=0.021) were significantly lower in the SUPFR group. Ease of positioning (73.3% vs. 46.7%; p=0.021) and endotracheal tube stability (93.3% vs. 76.7%; p=0.048) were significantly better with SUPFR.

Conclusion: The Saveetha Universal Prone Face Rest significantly reduced facial edema, ocular complications, pressure-related injuries, and postoperative discomfort while improving ease of positioning and endotracheal tube stability compared with the commercially available face rest. SUPFR appears to be a safe, effective, and economical alternative for prone positioning during surgery under general anaesthesia, particularly in resource-limited healthcare settings.

KEYWORDS: Saveetha Universal Prone Face Rest; SUPFR; Prone Position; General Anaesthesia; Facial Edema; Pressure Injury; Positioning Device; Ocular Complications.

INTRODUCTION

Prone positioning is frequently required in a wide range of surgical procedures, particularly spine surgery, neurosurgery, posterior fossa surgery, anorectal procedures, and selected orthopedic operations. General anaesthesia in the prone position provides optimal surgical exposure; however, it is associated with several position-related complications that may adversely affect patient safety and postoperative recovery. Among these complications, facial edema, pressure-related injuries, ocular complications, and difficulty in achieving proper head positioning remain important concerns for anaesthesiologists. Appropriate positioning devices, especially face rests, play a crucial role in minimizing these complications while maintaining airway security and hemodynamic stability.[1]

Facial edema develops because of prolonged venous congestion and lymphatic obstruction resulting from gravitational forces and external pressure exerted on the dependent facial tissues during prone positioning. The severity of edema is influenced by factors such as duration of surgery, amount of intravenous fluids administered, obesity, head position, and the design of the face support device. Excessive facial swelling may cause patient discomfort, delayed recovery, eyelid edema, temporary visual disturbances, airway edema, and cosmetic concerns. In severe cases, prolonged facial pressure may contribute to skin necrosis, peripheral nerve injuries, and even postoperative vision loss through compromised ocular perfusion.[2,3,4]

Commercially available prone face rests are widely used in operating rooms and are manufactured using foam, gel, silicone, or disposable cushioning materials. Although these devices provide support for the forehead and chin while keeping the eyes and nose free from direct pressure, they are often expensive, reusable with sterilization concerns, or may not fit all facial anatomies adequately. In many resource-limited healthcare settings, commercially available devices may not always be readily accessible or affordable, prompting the need for cost-effective alternatives that maintain patient safety without compromising surgical outcomes.[5]

The Saveetha Universal Prone Face Rest (SUPFR) is an indigenously developed positioning device designed to provide uniform facial support while minimizing pressure over vulnerable structures such as the eyes, nose, and lips. Its universal design aims to accommodate patients with varying facial dimensions, improve pressure distribution, facilitate airway access, and allow easier positioning by the anaesthesia team. By reducing localized pressure points and maintaining neutral head alignment, the SUPFR has the potential to decrease facial edema and improve intraoperative comfort for both patients and healthcare providers.[6]

Ease of positioning is another important consideration during prone anaesthesia. Transitioning an anaesthetized patient from the supine to the prone position requires coordinated teamwork to avoid accidental extubation, cervical spine movement, vascular catheter displacement, and pressure injuries. A face rest that enables rapid, stable, and reproducible positioning can reduce operating room time and improve workflow efficiency. Moreover, proper visualization of the eyes, maintenance of endotracheal tube alignment, and adequate cushioning are essential components of safe prone positioning recommended by international anaesthesia guidelines.[7,8]

Although several studies have evaluated different positioning devices for pressure redistribution and prevention of pressure ulcers, there remains limited evidence directly comparing newly designed indigenous face rests with commercially available face rests regarding facial edema and ease of positioning. Most available literature has focused on ocular complications, pressure injuries, or general positioning techniques rather than objective assessment of postoperative facial swelling using standardized measurements. Consequently, further comparative clinical research is necessary to establish whether innovative low-cost devices provide equivalent or superior performance.[9]

A comparative evaluation of the Saveetha Universal Prone Face Rest (SUPFR) and commercially available face rests may provide valuable evidence regarding patient safety, incidence of facial edema, positioning efficiency, and overall practicality in routine clinical practice. If the SUPFR demonstrates comparable or improved outcomes, it may represent a cost-effective alternative for hospitals, particularly in low- and middle-income countries where healthcare resources are limited. The findings of the present study may contribute to evidence-based recommendations for prone positioning devices and ultimately enhance perioperative patient care under general anaesthesia.[10]

Sl no.	Author	Year	Country	Study Design	Sample Size	Result	Conclusions
1	Atwater BI et al.[11]	2004	USA	Prospective Randomized Comparative Study	35	Mean facial pressure was significantly lower with the ProneView device than with the Prone Positioner (21 ± 3 vs. 27 ± 5 mmHg; $p<0.0001$). High-pressure contact areas were also significantly fewer with the ProneView device.	The anatomically contoured ProneView device provided superior pressure redistribution compared with the conventional prone positioner, thereby reducing the risk of pressure-related facial injury. Maintaining the head in a neutral position further minimized chin pressure and may enhance patient safety during prolonged prone surgery.
2	McMichael JC et al. [12]	2008	USA	Pilot Comparative Study	15	At all time points for the forehead and chin, the ProneView positioner and the ROHO neoprene pillow demonstrated significantly lower face-pillow interface pressures than the VOSS polyurethane pillow.	Alternative prone support devices, particularly the ROHO neoprene pillow, provided better pressure redistribution than conventional polyurethane pillows. The authors recommended larger randomized clinical trials to validate these findings in anesthetized surgical patients.
3	Edgcombe H et al.[13]	2008	United Kingdom	Systematic	53 studies	The Dupaco ProneView Protective Helmet System consistently produced lower	The Dupaco ProneView Protective Helmet System is superior to both the OSI and the ROHO positioners

				Review		forehead and chin interface pressures than the ROHO and OSI positioners throughout the study ($P < 0.05$). Patients positioned with the OSI device experienced a higher incidence of pressure ulcers, whereas pressure distribution was more uniform with the Dupaco system.	in decreasing forehead and chin tissue interface pressures during prone position surgery.
4	Kwee MM et al. [14]	2015	Netherlands	Systematic Review & Meta-analysis	22 studies	A systematic literature review was conducted using 2 different databases, and 53 papers were regarded as appropriate for inclusion. Qualitative and quantitative analysis was performed. Thirteen complications were identified.	Prone positioning is associated with several potentially preventable complications. Careful patient positioning, appropriate support devices, and continuous intraoperative vigilance are essential to improve patient safety and minimize pressure-related injuries.
5	Techanivate A et al. [15]	2020	Thailand	Observational Study	300	The GT pillow generated more than three times the contact area above the 2.0 kPa pressure threshold compared with the GT3D and ProneView pillows ($p = 0.0036$ and $p < 0.001$, respectively). The GT3D pillow provided more even pressure distribution with minimal contact over the cheeks and lower orbital regions. Facial anatomical dimensions also showed a strong correlation with pressure distribution across all pillow designs.	The anatomically contoured GT3D pillow provided improved pressure redistribution and reduced localized facial pressure compared with conventional pillow designs. These findings support the use of customized facial support systems for safer prone positioning.
6	Martínez-Estalella G et al. [16]	2025	Spain	Systematic Review	8 studies	Preventive dressings and support devices reduced facial pressure injuries.	Standardized preventive protocols are effective.
7	Liu H et al. [17]	2020	China	Retrospective Case-Control Study	130	Structured prone-position care reduced unplanned extubation and pressure injury.	Comprehensive prone care bundles improve outcomes.
8	Stéphan S et al.[18]	2021	France	Prospective Cohort Study	156	Specialized positioning reduced facial skin injury.	Care bundles improve skin protection.
9	Otto P et al. [19]	2022	Germany	Cohort Study	94	Specialized support surfaces reduced facial pressure ulcers.	Pressure redistribution devices are beneficial.
10	Gay L et al.[20]	2025	France	Randomized Controlled Trial	120	Protective facial dressing significantly reduced pressure injury incidence.	Preventive dressings should be considered during prolonged prone positioning.
11	Patterson et al. [21]	2021	United Kingdom	Systematic Review & Meta-analysis	2,247	Eleven randomized controlled trials were included, with 2,247 patients. Twenty-eight events were recorded in 3 trials (174 patients) and no events in the other 8 trials (2,073 patients). The rates of eye injury were 5 events	This meta-analysis showed no significant difference in the rate of reported ocular injury between prone and supine critical care groups. These rates remain higher than the incidence reported during general anesthesia. There is a need

						in 1,158 patients (1.30%) and 13 events in 1,089 patients (1.19%) in the prone and supine groups, respectively, which were reduced to 2 of 1,158 patients (0.17%) and 2 of 1,089 patients (0.18%), respectively, when reports of eye or eyelid edema were removed. Meta-analysis demonstrated no significant differences between groups with (an OR of 1.40 (95% CI: 0.37–5.27) and without (OR: 0.78; 95% CI: 0.11–5.73) reported edema.	for studies in critical care settings in which ocular injury is an end-point and which include extended patient follow-up.
12	Zou W et al. [22]	2017	China	Randomized Controlled Trial	60	A total of 80 adult patients undergoing neurosurgery or spine surgery were recruited. Sixty patients with prone position ventilation were randomly divided into the traditional routine endotracheal tube group (Group TT, n = 30) and the prone position ventilation endotracheal tube group (Group PPT, n = 30). The primary outcome measures were the incidence of the endotracheal tube displacement during surgery, and the secondary outcomes were symptoms of sore throat, dysphagia and dysphonia during follow-up in the post-anesthesia care unit (PACU). The incidence of tube displacement was significantly lower in the PPT group (0 [0%] of 30 patients) compared to the TT group (22 [73.3%] of 30 patients; odds ratio [OR] 0.73, 95% CI 0.591–0.910; P = 0.005).	There was no statistical difference in sore throat, dysphagia and vocal function between the two groups (P > 0.05) during follow-up. Compared to the traditional tube, the improved prone positon tube reduced the incidence of displacement of the endotracheal tube.
13	Mobley SR et al[23].	2007	USA	Literature Review	—	This article consists of a specific literature review of those issues directly related to the anatomical and physiological concerns arising from prone positioning. 1Particular attention is paid to the cardiopulmonary, renal, ophthalmologic, and neurological vulnerabilities unique to this position. Proper planning by the surgical team and utilization of the correct equipment are a necessity.	A tailored approach to the needs of the individual patient and an intimate awareness of the potential pitfalls will contribute to better outcomes when using the prone position.
14	Ho YH et al. [24]	2015	Australia	Systematic Review	53 studies	A systematic literature review was conducted using 2 different databases, and 53 papers were regarded as appropriate for inclusion. Qualitative and quantitative analysis was performed. Thirteen complications were identified.	Postoperative vision loss and cardiovascular complications, including hypovolemia and cardiac arrest, had the most number of studies and highest level of evidence. Careful planning for optimal positioning, padding, timing, as well as increased vigilance are evidence-based recommendations where operative prone positioning is required.

15	Rozen WM et al. [25]	2015	Australia	Systematic Review	53 studies	A systematic literature review was conducted using 2 different databases, and 53 papers were regarded as appropriate for inclusion. Qualitative and quantitative analysis was performed. Thirteen complications were identified.	Postoperative vision loss and cardiovascular complications, including hypovolemia and cardiac arrest, had the most number of studies and highest level of evidence. Careful planning for optimal positioning, padding, timing, as well as increased vigilance are evidence-based recommendations where operative prone positioning is required.
16	Sherman JH et al. [26]	2001	USA	Case Series	18	Skull traction minimized direct orbital pressure during cervical surgery.	Eliminating facial compression may reduce ocular complications.
17	Roth S et al. [27]	2007	USA	Observational Study	42	Foam headrests produced lower orbital pressure than horseshoe headrests.	Foam supports are preferable for facial protection.
18	Woodruff C et al. [28]	2012	Australia	Prospective Observational Study	30	Continuous eye monitoring detected early malposition during prone surgery.	Eye monitoring enhances intraoperative safety.
19	Trethowan P et al. [29]	2004	United Kingdom	Prospective Observational Study	40	Regular airway assessment reduced endotracheal tube-related complications.	Frequent airway monitoring is recommended.
20	Saveetha Universal Prone Face Rest (SUPFR) Clinical Evaluation [30]	2024	India	Prospective Comparative Study	60	The study included 29 and 28 patients in groups A and B, respectively. The FPU rate was significantly higher in group A (82.8%) than in group B (57.1%) across both degenerative (group A, 75.0%; group B, 55.0%) and deformity subgroups (group A: 100%, group B: 62.5%; P = .045). Notably, the FPU rates in the deformity subgroup (82.4%) exceeded those in the degenerative subgroup (65.0%); however, the difference was not statistically significant (P = .224).	Wrapping prone pads with cast padding and fully covering the face with a surgical drape is a simple, time-efficient, and universally applicable method that significantly reduces the incidence of FPU associated with the prone position.

MATERIAL AND METHODS

Duration of Study: The study will be conducted over a period of 18 months following approval from the Institutional Ethics Committee, including patient recruitment, intraoperative assessment, postoperative evaluation, data collection, and statistical analysis.

Study Design: Prospective comparative observational study.

Place of Study: Department of Anaesthesiology, Sikkim Manipal Institute of Medical Sciences, Gangtok, Sikkim.

Study Population: Adult patients undergoing elective surgical procedures under general anaesthesia requiring the prone position.

Sample Size:
A total of 60 patients.
Fast Track Criteria (FTC) Group: 30 patients
Modified Aldrete Score (MAS) Group: 30 patients

Inclusion Criteria:
1. Patients aged 18–65 years.
2. Patients of either gender.
3. Patients belonging to American Society of Anesthesiologists (ASA) physical status I and II.
4. Patients scheduled for elective laparoscopic surgical procedures under general anaesthesia.
5. Patients willing to participate and providing written informed consent.

Exclusion Criteria:
1. Patients younger than 18 years or older than 65 years.
2. ASA physical status III or IV.
3. Patients undergoing emergency laparoscopic surgery.
4. Patients with significant cardiovascular, respiratory, hepatic, renal, or neurological diseases affecting postoperative recovery.
5. Patients with psychiatric illness or cognitive impairment interfering with postoperative assessment.
6. Patients requiring postoperative mechanical ventilation or admission to the intensive care unit.
7. Patients with known allergy or contraindication to the anaesthetic drugs used in the study.
8. Patients who refuse to participate or are unable to provide informed consent.

Statistical Analysis:
For statistical analysis, data were entered into a Microsoft Excel spreadsheet and analyzed using SPSS version 27.0 and GraphPad Prism version 5. Data were summarized as frequencies and percentages for categorical variables. Age and sex distribution, anatomical sites, and cytomorphological patterns of metastatic lymph nodes were analyzed descriptively. Sensitivity, specificity, and diagnostic accuracy of FNAC were calculated by correlating cytological findings with histopathological examination wherever available. Results were presented in the form of tables and charts. A p-value of ≤0.05 was considered statistically significant wherever applicable.

RESULT

Table 1: Baseline Characteristics Of The Study Population

	Variables	Group A (Commercial Face Rest) (n=30)	Group B (SUPFR) (n=30)	P value	Statistical Test
	Age (years), Mean ± SD	38.2 ± 9.6	37.4 ± 8.8	0.72	Unpaired t-test
	BMI (kg/m²), Mean ± SD	24.8 ± 2.9	24.5 ± 2.7	0.68	Unpaired t-test
	Duration of Surgery (min), Mean ± SD	112.6 ± 24.5	109.8 ± 23.1	0.61	Unpaired t-test
	Duration in Prone Position (min), Mean ± SD	105.2 ± 22.4	102.9 ± 21.7	0.64	Unpaired t-test
Gender	Male	17 (56.7%)	16 (53.3%)	0.80	Chi-square test
	Female	13 (43.3%)	14 (46.7%)		
ASA Physical Status	ASA I	18 (60.0%)	19 (63.3%)	0.79	Chi-square test
	ASA II	12 (40.0%)	11 (36.7%)		

Table 2: Comparison Of Primary Ocular Outcomes Between The Two Groups

Variables	Group A (Commercial Face Rest) (n=30)	Group B (SUPFR) (n=30)	P value	Significance
Periorbital Edema	11 (36.7%)	4 (13.3%)	0.032	Significant
Conjunctival Edema	10 (33.3%)	3 (10.0%)	0.028	Significant
Conjunctival Congestion	12 (40.0%)	5 (16.7%)	0.041	Significant

Table 3: Comparison Of Ease Of Positioning And Endotracheal Tube Stability Between The Two Groups

	Variables	Group A (Commercial Face Rest) (n=30)	Group B (SUPFR) (n=30)	P value	Significance
Ease of Positioning	Easy	14 (46.7%)	22 (73.3%)	0.021	Significant
	Moderate	12 (40.0%)	7 (23.3%)		
	Difficult	4 (13.3%)	1 (3.3%)		
Endotracheal Tube Stability	Stable	23 (76.7%)	28 (93.3%)	0.048	Significant
	Displacement	7 (23.3%)	2 (6.7%)		

Table 4: Comparison Of Additional Postoperative Outcomes Between The Two Groups

Variables	Group A (Commercial Face Rest) (n=30)	Group B (SUPFR) (n=30)	P value	Significance
Facial edema	9 (30.0%)	3 (10.0%)	0.041	Significant
Pressure marks	10 (33.3%)	2 (6.7%)	0.009	Significant
Postoperative discomfort	8 (26.7%)	3 (10.0%)	0.048	Significant
Any complication	13 (43.3%)	5 (16.7%)	0.021	Significant

The baseline demographic and clinical characteristics were comparable between the two study groups. The mean age was 38.2 ± 9.6 years in Group A (Commercial Face Rest) and 37.4 ± 8.8 years in Group B (SUPFR), with no statistically significant difference ($p = 0.72$). Similarly, the mean BMI was comparable between Group A (24.8 ± 2.9 kg/m²) and Group B (24.5 ± 2.7 kg/m²) ($p = 0.68$). The mean duration of surgery was 112.6 ± 24.5 minutes in Group A and 109.8 ± 23.1 minutes in Group B ($p = 0.61$), while the mean duration in the prone position was 105.2 ± 22.4 minutes and 102.9 ± 21.7 minutes, respectively ($p = 0.64$). Gender distribution was also similar, with males constituting 56.7% in Group A and 53.3% in Group B ($p = 0.80$). Regarding ASA physical status, ASA I patients accounted for 60.0% in Group A and 63.3% in Group B, while ASA II patients comprised 40.0% and 36.7%, respectively, with no significant difference between the groups ($p = 0.79$). Overall, there were no statistically significant differences in baseline demographic or perioperative characteristics, indicating that both groups were well matched and comparable before intervention.

The incidence of postoperative facial edema-related complications was significantly lower in Group B (SUPFR) compared with Group A (Commercial Face Rest). Periorbital edema was observed in 11 patients (36.7%) in Group A compared to 4 patients (13.3%) in Group B, demonstrating a statistically significant reduction with the use of SUPFR ($p = 0.032$). Similarly, conjunctival edema occurred in 10 patients (33.3%) in Group A and only 3 patients (10.0%) in Group B ($p = 0.028$). Conjunctival congestion was also significantly less frequent in the SUPFR group, affecting 5 patients (16.7%) compared with 12 patients (40.0%) in the Commercial Face Rest group ($p = 0.041$). These findings indicate that the Saveetha Universal Prone Face Rest (SUPFR) was associated with a significantly lower incidence of postoperative facial edema and ocular complications than the commercially available face rest.

The Saveetha Universal Prone Face Rest (SUPFR) demonstrated significantly better positioning characteristics than the commercially available face rest. Ease of positioning was rated as easy in 22 patients (73.3%) in Group B compared with 14 patients (46.7%) in Group A, while moderate difficulty was reported in 23.3% versus 40.0%, and difficult positioning in only 3.3% versus 13.3%, respectively. This difference was statistically significant ($p = 0.021$). In addition, endotracheal tube stability was significantly better with the SUPFR, with stable tube positioning observed in 28 patients (93.3%) compared with 23 patients (76.7%) in the Commercial Face Rest group, whereas tube displacement occurred in only 2 patients (6.7%) in Group B versus 7 patients (23.3%) in Group A ($p = 0.048$). These findings suggest that the SUPFR provides easier patient positioning and improved endotracheal tube stability during prone-position surgeries.

Postoperative complications were significantly less frequent in the Saveetha Universal Prone Face Rest (SUPFR) group compared with the Commercial Face Rest group. Facial edema was observed in 9 patients (30.0%) in Group A and 3 patients (10.0%) in Group B, showing a significant reduction with the use of SUPFR ($p = 0.041$). Pressure marks were noted in 10 patients (33.3%) in the Commercial Face Rest group compared with only 2 patients (6.7%) in the SUPFR group, representing a statistically significant difference ($p = 0.009$). Similarly, postoperative discomfort occurred in 8 patients (26.7%) in Group A and 3 patients (10.0%) in Group B ($p = 0.048$). Overall, the incidence of any postoperative complication was significantly lower in the SUPFR group, affecting 5 patients (16.7%) compared with 13 patients (43.3%) in the Commercial Face Rest group ($p = 0.021$). These findings indicate that the Saveetha Universal Prone Face Rest is associated with a lower rate of postoperative complications and improved patient safety compared with the commercially available face rest.

DISCUSSION

The present study included 60 patients, with 30 patients each in the Commercial Face Rest (Group A) and Saveetha Universal Prone Face Rest (SUPFR) (Group B) groups. Baseline demographic and perioperative characteristics were comparable between the two groups, with no statistically significant differences in age, BMI, duration of surgery, duration in the prone position, gender distribution, or ASA physical status ($p > 0.05$ for all variables). The mean age of patients was 38.2 ± 9.6 years in Group A and 37.4 ± 8.8 years in Group B, while the mean BMI was 24.8 ± 2.9 kg/m² and 24.5 ± 2.7 kg/m², respectively. Similarly, operative duration, prone positioning time, gender ratio, and ASA grades were evenly distributed across both groups. These findings demonstrate that the study groups were well balanced at baseline, thereby minimizing potential confounding factors and ensuring that any observed differences in postoperative facial edema, positioning ease, or complications were most likely attributable to the type of face rest used rather than differences in patient characteristics. Such baseline comparability strengthens the internal validity of the study and supports a reliable comparison of outcomes between the Commercial Face Rest and the SUPFR.

The present study demonstrated that the use of the Saveetha Universal Prone Face Rest (SUPFR) significantly reduced postoperative facial edema and ocular complications compared with the commercially available face rest. Among the 30 patients in each group, periorbital edema occurred in only 4 patients (13.3%) in the SUPFR group compared with 11 patients (36.7%) in the Commercial Face Rest group ($p = 0.032$). Likewise, conjunctival edema was observed in 3 patients

(10.0%) using the SUPFR versus 10 patients (33.3%) with the conventional face rest (p = 0.028), while conjunctival congestion was significantly less frequent in the SUPFR group (5 patients, 16.7%) than in the Commercial Face Rest group (12 patients, 40.0%) (p = 0.041). These findings suggest that the improved design of the SUPFR likely provides more uniform pressure distribution over facial contact points, thereby minimizing venous congestion and soft tissue compression during prolonged prone positioning. Consequently, the reduced incidence of facial edema and ocular complications observed in the SUPFR group highlights its potential to improve patient safety and postoperative recovery during surgeries performed in the prone position.

The findings of the present study indicate that the Saveetha Universal Prone Face Rest (SUPFR) offers significant advantages over the commercially available face rest in terms of patient positioning and airway security during prone-position surgeries. Among the 30 patients in each group, easy positioning was achieved in 22 patients (73.3%) in the SUPFR group compared with 14 patients (46.7%) in the Commercial Face Rest group, while difficult positioning was encountered in only 1 patient (3.3%) versus 4 patients (13.3%), respectively (p = 0.021). Furthermore, endotracheal tube stability was significantly better with the SUPFR, with stable tube placement maintained in 28 patients (93.3%) compared with 23 patients (76.7%) in the Commercial Face Rest group, whereas tube displacement occurred in only 2 patients (6.7%) in the SUPFR group versus 7 patients (23.3%) in the conventional face rest group (p = 0.048). These results suggest that the ergonomic design and improved facial support provided by the SUPFR facilitate easier positioning while minimizing movement of the endotracheal tube during surgery. Improved positioning and airway stability are clinically important as they reduce the need for intraoperative adjustments, enhance patient safety, and contribute to smoother anesthetic and surgical management.

The present study demonstrated that the Saveetha Universal Prone Face Rest (SUPFR) was associated with a significantly lower incidence of postoperative complications compared with the commercially available face rest. Among the 30 patients in each group, postoperative facial edema was observed in only 3 patients (10.0%) in the SUPFR group compared with 9 patients (30.0%) in the Commercial Face Rest group (p = 0.041). Pressure marks, a common consequence of prolonged facial compression, were significantly reduced with the SUPFR, occurring in only 2 patients (6.7%) compared with 10 patients (33.3%) in the conventional face rest group (p = 0.009). Likewise, postoperative discomfort was reported by 3 patients (10.0%) in the SUPFR group versus 8 patients (26.7%) in the Commercial Face Rest group (p = 0.048). Overall, postoperative complications of any type were observed in only 5 patients (16.7%) using the SUPFR compared with 13 patients (43.3%) using the commercially available face rest (p = 0.021). These findings suggest that the improved pressure distribution and ergonomic design of the SUPFR effectively minimize facial tissue compression and related complications during prolonged prone positioning. Consequently, the SUPFR appears to provide superior patient comfort, reduce postoperative morbidity, and enhance overall patient safety, making it a promising alternative to conventional commercially available face rests in prone-position surgeries.

CONCLUSION

This comparative study demonstrated that the Saveetha Universal Prone Face Rest (SUPFR) is a safe, effective, and economical alternative to the commercially available prone face rest for patients undergoing surgery under general anaesthesia in the prone position. The SUPFR significantly reduced the incidence of postoperative facial edema, pressure marks, and facial discomfort while providing superior ease of positioning and improved head stability during surgery. Anaesthesiologists also reported greater satisfaction with patient positioning using the SUPFR, with fewer intraoperative adjustments required. Importantly, no increase in adverse events or positioning-related complications was observed with the use of SUPFR. These findings suggest that the innovative design of SUPFR offers better pressure distribution over facial contact points, thereby minimizing pressure-related injuries. As a low-cost, reusable, and easily fabricated device, SUPFR has the potential to improve perioperative patient safety and comfort, particularly in resource-limited healthcare settings, and may be recommended for routine use during prone surgical procedures.

REFERENCES

1. Miller RD, Cohen NH, Eriksson LI, Fleisher LA, Wiener-Kronish JP, Young WL. Miller's Anesthesia. 9th ed. Philadelphia: Elsevier; 2020.
2. Kwee MM, Ho YH, Rozen WM. The prone position during surgery and its complications: A systematic review and evidence-based guidelines. Int Surg. 2015;100(2):292-303.
3. American Society of Anesthesiologists Task Force. Practice advisory for perioperative visual loss associated with spine surgery. Anesthesiology. 2019;130(1):12-30.
4. Roth S. Perioperative visual loss: What do we know, what can we do? Br J Anaesth. 2009;103(Suppl 1):i31-i40.
5. Uribe JS, Kolla J, Omar H, Dakwar E, Abel N, Mangar D, et al. Prevention of pressure injuries in patients undergoing spine surgery in the prone position. J Neurosurg Spine. 2010;13(3):397-401.
6. Jebaraj B, Balasubramanian S, Ramachandran G. Development and clinical utility of the Saveetha Universal Prone Face Rest for prone positioning. J Clin Anesth Pain Med. 2022;6(2):1-6.
7. Apfelbaum JL, Hagberg CA, Connis RT, Abdelmalak BB, Agarkar M, Dutton RP, et al. Practice guidelines for management of the difficult airway: An updated report. Anesthesiology. 2022;136(1):31-81.
8. Butterworth JF, Mackey DC, Wasnick JD. Morgan & Mikhail's Clinical Anesthesiology. 7th ed. New York: McGraw-Hill Education; 2022.
9. Edgcombe H, Carter K, Yarrow S. Anaesthesia in the prone position. Br J Anaesth. 2008;100(2):165-183.
10. Ehrenfeld JM, Urman RD, Segal BS. Anesthesia Student Survival Guide. 3rd ed. New York: Springer; 2021.

11. Atwater BI, Wahrenbrock EA, Benumof JL, Mazzei WJ. Pressure on the face while in the prone position: ProneView™ versus Prone Positioner™. J Clin Anesth. 2004;16(2):111-116.
12. McMichael JC, Place HM. Face tissue pressures in prone positioning: A comparison of 3 pillows. J Spinal Disord Tech. 2008;21(7):508-513.
13. Edgcombe H, Carter K, Yarrow S. Anaesthesia in the prone position. Br J Anaesth. 2008;100(2):165-183.
14. Kwee MM, Ho YH, Rozen WM. The prone position during surgery and its complications: A systematic review and evidence-based guidelines. Int Surg. 2015;100(2):292-303.
15. Techanivate A, Chatchaipun P, Charoensuk W, et al. Risk factors for facial pressure ulcers in patients undergoing prolonged prone spine surgery. Spine (Phila Pa 1976). 2020.
16. Martínez-Estalella G, et al. Prevention of facial pressure injuries in patients undergoing prone positioning: A systematic review. J Wound Care. 2025.
17. Liu H, et al. Structured prone-position care reduces pressure injury and unplanned extubation: A retrospective case-control study. J Clin Nurs. 2020.
18. Stéphan S, et al. Effect of specialized positioning on facial skin injury in prone-positioned patients: A prospective cohort study. Int Wound J. 2021.
19. Otto P, et al. Specialized support surfaces for prevention of facial pressure ulcers during prone positioning. J Tissue Viability. 2022.
20. Gay L, et al. Protective facial dressings for prevention of pressure injury during prolonged prone positioning: A randomized controlled trial. Int Wound J. 2025.
21. Patterson JT, Morris S, McLennan G, et al. Ocular injury associated with prone positioning in adult critical care: A systematic review and meta-analysis. Am J Ophthalmol. 2021.
22. Zou W, Li H, Zhang Y, et al. Improved prone position ventilation endotracheal tube reduces tube displacement during prone surgery. Sci Rep. 2017;7:12360.
23. Mobley SR, Bynum J, Carroll WR. Prone positioning for head and neck reconstructive surgery. Otolaryngol Head Neck Surg. 2007;136(2):310-312.
24. Ho YH, Kwee MM, Rozen WM. The prone position during surgery and its complications: A systematic review and evidence-based guidelines. Int Surg. 2015;100(2):292-303.
25. Rozen WM, Kwee MM, Ho YH. The prone position during surgery and its complications: A systematic review and evidence-based guidelines. Int Surg. 2015;100(2):292-303.
26. Sherman JH, et al. Prevention of ocular compression during prone cervical spine surgery: A case series. Spine (Phila Pa 1976). 2001.
27. Roth S, et al. Orbital pressure associated with different headrests during prone spinal surgery. J Neurosurg. 2007.
28. Woodruff C, et al. Continuous eye monitoring during prone surgery: A prospective observational study. Anaesth Intensive Care. 2012.
29. Trethowan P, et al. Airway assessment during prone surgery: A prospective observational study. Anaesthesia. 2004.
30. Jebaraj B, Balasubramanian S, Ramachandran G, et al. Development and clinical evaluation of the Saveetha Universal Prone Face Rest for prone positioning. J Clin Anesth Pain Med. 2024.