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A Prospective Observational Study to Find the Incidence of Position Related Injuries in Patients Undergoing Urological Procedures under Anaesthesia

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Abstract
Introduction: *Patient positioning before a surgical procedure involves a combined effort of the surgeons and the anaesthesiologist. In fact the entire operating team shares the responsibility. It is of prime importance to maintain a balance between optimal surgical positioning and the safety of the patient. Though patient positioning for optimal surgical access is vital, many of these positions can induce adverse physiological consequences which can affect the haemodynamics of the patient.*
Materials and Methods: *This study was conducted in the operating rooms of the Department of Anesthesia, Great Eastern medical School and Hospital, Ragolu, Srikakulam for a period of 6 months. The study was done among done among 291 consecutive consenting patients who fulfilled the inclusion criteria. They were enrolled in the study after obtaining written informed consent.*
Results: *292 patients were enrolled in the study. In 291 patients the data was complete and included in the analysis. All the patients undergoing urological procedures in the operating rooms of Department of Anesthesia, Great Eastern medical School and Hospital, Ragolu, Srikakulam were enrolled. There were no exclusion criteria. Concerning the position used for the urological procedure, the lithotomy position was used for a little more than half of the patients recruited (55 %). The other less predominant positions used were supine, lateral and prone (17.5%,13.8%and 9.3 respectively). The high lithotomy was used in only 1 % of cases.*
Conclusion: *In this study our aim was to know the incidence of position related injuries and incidents in urological procedures under anaesthesia. We have observed that the incidence of injuries related to position is 2.1 % which is less than previous studies done on urological procedures. Most of the injuries reported were in the eyes and head like chemosis, periorbital edema lip edema. The only nerve injury which occurred was sensory neuropraxia where the patient complained of numbness in the lateral aspect of the left leg observed post operatively. The patient had undergone redo anastomotic urethroplasty under general anaesthesia. This was due to the long duration of procedure (> than 6 hours) in the lithotomy position.*
Key Words: *anaesthesia, chemosis, periorbital edema lip edema, urethroplasty*

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I. Introduction

Patient positioning before a surgical procedure involves a combined effort of the surgeons and the anaesthesiologist. In fact the entire operating team shares the responsibility.[1] It is of prime importance to maintain a balance between optimal surgical positioning and the safety of the patient. Though patient positioning for optimal surgical access is vital, many of these positions can induce adverse physiological consequences which can affect the haemodynamics of the patient. This can result in significant cardiovascular and respiratory compromise especially in patients with associated co-morbidities.[2] More over under anaesthesia the compensatory mechanisms of the human body are compromised. One common undesirable physiological change is hypotension due to decreased venous return to the heart. The other one commonly seen is oxygen desaturation due to ventilation perfusion mismatch. There are also injuries and insults that can occur due to poor patient positioning (1). The commonly occurring injury appears to be peripheral nerve injury of which ulnar neuropathy is the commonest (2).[3]

A retrospective study conducted by Welch MB et al for a 10 year period showed that injuries due to urological procedures constituted 15 % of all the cases reported and 13 % of all the peripheral nerve injuries that were reported.[4]

Urological procedures under anaesthesia involve different kinds of positions and proper positioning is vital to the surgeons operating to reach the retroperitoneal and pelvic organs.[5]

II. Materials And Methods

This study was conducted in the operating rooms of the Department of Anesthesia, Great Eastern medical School and Hospital, Ragolu, Srikakulam for a period of 6 months. The study was done among done among 291 consecutive consenting patients who fulfilled the inclusion criteria. They were enrolled in the study after obtaining written informed consent.

PARTICIPANTS

Inclusion criteria

1. All patients undergoing urological procedures in the operating rooms of Great Eastern medical School and Hospital, Ragolu, Srikakulam.
2. All ASA (American Society of Anaesthesiologists) 1, 2, 3, 4 and 5

ASA GRADING

1. Normal healthy individual
2. Mild to moderate systemic disease, not limiting function.
3. Severe systemic disease, some limitation of function.
4. Incapacitating systemic disease, constant threat to life.
5. Not expected to survive more than 24 hours with or without operation.

Exclusion criteria

Not consenting to be part of the study

III. Methodology

Protocol: All patients undergoing urological procedures under anaesthesia were recruited into the study after obtaining appropriate informed consent. The clinical history, co-morbidities (Diabetes, Hypertension, CRF, Hypothyroidism, peripheral vascular disease), preoperative neurological and vascular abnormalities were noted. The preoperative assessment was done by the principal investigator. All patients underwent the procedure as planned and the anaesthetic management (general anaesthesia /regional anaesthesia / conscious sedation/combined) was decided as per the concerned anesthetist's clinical judgment. The operative position was decided by the urologist and the anaesthetist. The nature of position, time taken to position, number of people involved, and the positioning aids were noted. Any adverse hemodynamic changes or incidents occurring during or after the positioning were noted (change in Mean Arterial Pressure/ heart rate ± 20% of baseline in five minutes). The positioning aids used like prone pillows, axillary rolls, armrests/arm boards, saline bags, jelly rests were noted. At the end of the surgery the patient was re-examined for any injuries or incidents related to positioning. Any of the following injuries such as chemosis, conjunctival injury, corneal injury, blindness, peri orbital edema, extremity motor/sensory deficit, brachial plexus injuries, and gangrene and compartment syndrome was looked for. Any critical incidents during positioning such as endotracheal tube dislodgement and kinking, accidental extubation, dislodgement of venous and arterial lines and duration of loss of effective monitoring due to monitor dislodgement were observed. Factors contributing to positional injury were categorized as patient related, procedure related, position related and anaesthesia related. The management of these injuries and their progress were followed up. The incidence of these injuries and incidents were analyzed and the risk factors associated were analyzed.

Calculation of Sample Size: Based on the study by Wolf et al the prevalence of positioning injuries was 2.5%. In order to estimate this, with the precision of 1%, with 95% CI then we need to study nearly 936 subjects. However, if the precision is 1.5% we need to study nearly 416 subjects. Therefore, we have decided to study nearly 900 subjects which would provide nearly 1 to 1.25% precision with 95% CI. However, due to lack of sufficient time and cases, we have analysed the data at a sample size of 292 cases. Formula: Statistical Analysis The analysis was done using Stata version 10. Descriptive statistics were done for variables like age, gender, ASA status, BMI, associated co morbidities, position of the patients, type of anaesthesia used.

Comparison of proportions were done between those who had position related injuries and incidents and those who did not. Incidence of injuries is presented as percentage : Number of reported injuries ÷ Total number of

study population ×100 Incidence of incidents is presented as percentage: Number of reported incidents÷ Total number of the study population×100 Pie charts and Bar diagrams were made using proportions of variables.

IV. Results

292 patients were enrolled in the study. In 291 patients the data was complete and included in the analysis. All the patients undergoing urological procedures in the operating rooms of Department of Anesthesia, Great Eastern medical School and Hospital, Ragolu, Srikakulam were enrolled. There were no exclusion criteria.

S.No	Descriptive (n=291)	Number (%)
1	Male	234 (80.1%)
2	Female	57 (19.9%)
3	Age < 40 years	89 (30.5%)
4	40-60 years	123 (42.1%)
5	>60 years	80 (27.4%)
6	ASA status	
7	1	149 (51.4%)
8	2	135 (46.2%)
9	3	7 (2.4%)

Table 1: Demographic details of the study participants

S.No	Position (n=291)	Percentage
1	**Supine**	**17.5**
2	**Prone**	**9.3**
3	**Lateral**	**13.8**
4	**Lateral decubitus**	**3.2**
5	**Lithotomy**	**54.6**
6	**High Lithotomy**	**1**
7	**Reverse trendelenburg**	**0.3**
8	**Head down tilt**	**0.3**

Table 2: Position of the patient for surgery

Concerning the position used for the urological procedure, the lithotomy position was used for a little more than half of the patients recruited (55 %). The other less predominant positions used were supine, lateral and prone (17.5%, 13.8%and 9.3 respectively). The high lithotomy was used in only 1 % of cases.

S.No	Type of urological procedure	Number (%)
1	Open	106 (36.4%)
2	Endoscopic	154 (52.9%)
3	Laparoscopic	30 (10.3%)

Table 3: Distribution of the types of urological procedures performed

The proportion of open, endoscopic and laparoscopic procedures done in the study population. Endoscopic procedures formed a major chunk of the urological procedures (53%). Laparoscopic procedures accounted for only 10% of the procedures done. The rest of the procedures were open surgeries (36%).

S.No	Position related injury	Number (%)
1	Position injuries	
	No	285 (97.9%)
	Yes	6 (2.1)
2	Eye	4/6
	Redness	2 (50)
	Chemosis	2 (50)
	Periorbital oedema	4 (100)
	Head and neck	2/6
	Lip edema	2 (100)
	Lower limbs	2/6
	Skin edema	1 (50)
	Nerve injury	1 (50)

Table 4: Position-related injuries

The incidence of position related injuries that has occurred in the study population. There were six injuries noted with an incidence of 2.1 %. Out of the 6 injuries 4 patients had eye injuries of which there were 2 cases of chemosis and 2 cases of redness in the eyes and 4 incidences of periorbital edema. Some of the patients had a combination of injuries in the eye. 2 patients had injuries in the head and neck region of which both the injuries were lip edema. Both the cases were in the prone position.

The other 2 patients who have had injuries occurred in the lower limbs of which one patient had skin edema of the leg and the other patient had sensory neuropathy on the left leg.

There were no injuries seen in the chest and abdominal area like skin peeling, injury to breasts/ genitalia etc. No vascular injuries like loss of peripheral pulses and gangrene were also observed. Injuries to the brachial plexus and upper limbs like paresis, palsy, edema and compartment syndrome did not occur in any of the patients.

S.No S.No	Position of the patient for surgery Position of the patient for surgery	Position related injuries		Total
		No	Yes	
1	Supine	50	1	51
2	Prone	24	3	27
3	Lateral	40	0	40
4	Lateral Decubitus	9	0	9
5	Lithotomy	157	2	159
6	High Lithotomy	3	0	3
7	Reverse trendelenburg	1	0	1
8	Head down tilt	1	0	1
9	Total	285	6	291

Table 5: Comparison of position of the patient with position related injuries

Positions of patients who developed position related injuries. Half the injuries occurred in the prone position (3 out of 6). Two of the other injuries occurred in the lithotomy position and only one injury was reported in the supine position. No injuries were reported in the lateral, lateral decubitus and high lithotomy positions.

S.No	Type of anesthesia used	Position related injuries		Total
		No	Yes	
1	GA	122	4	126
2	Spinal	136	1	137
3	Combined	26	1	27
4	Local	1	0	1
5	Total	285	6	291

Table 6: Comparison of position related injuries to the type of anaesthesia used

The relative comparison of the position of the patient to the incidents that has occurred. Four events occurred in lateral position whereas three events took place prone position. As expected prone and lateral positions were associated with higher incidents and position related injuries.

However, only two events were noticed in the lithotomy position and one in the supine position. It is significant to note although lithotomy position was used in majority of cases (158 times) that only 2 incidents occurred in the lithotomy position. There were no adverse events seen in high lithotomy, reverse trendelenburg and the lateral decubitus positions.

V. Discussion

Optimal positioning is a need of the surgeon for the best surgical access. At the same time care must be taken to minimize the risk of injury to the patient and avoid the adverse outcomes that can occur as a result of positioning. Each position carries some risk and this risk is more in the anaesthetized patients who are not aware nor can express discomfort on compromised positions. Urological procedures involve different kinds of positions as these surgeries require access to the urogenital organs, the pelvis, kidneys and the retro peritoneum.[7] In order to access these structures various surgical approaches like open, laparoscopic, endoscopic and robotic are practiced. In urological procedures the common positions used are the supine, lithotomy, high lithotomy, lateral, lateral decubitus, kidney bench and jackknife. Many of these positions are modified with a vertical tilt (trendelenburg or reverse trendelenburg).[8]

According to American society of anaesthesiologists closed claims project, since 1990, 10 nerve injuries (7%) were directly related to patient positioning in 143 claims reviewed. The incidence of nerve injury in open general surgery is 0.14% in a study done by Parks et al. In another study done on open retropubic radical prostatectomy, the incidence was seen to be only 0.3 %. In our study only one patient sustained nerve injury from the whole study population. It was an isolated case of sensory neuropathy which occurred in the lateral part of the left leg. The incidence calculated is 0.3 % which is similar to the study done on open retropubic radical prostatectomy.[9]

In a study done by James T Mills et al on positioning injuries occurring in patients undergoing robotic assisted urological surgery an incidence of 6.6 % of the injuries were reported.

In our study the BMI was also compared to the injuries and incidents related to position. Considering the injuries two were seen in the underweight population which may be of significance (6%). Three were noticed in the normally built population (1.8%). On analyzing the incidents in comparison with the BMI the maximum number of incidents occurred among the normal built and the overweight sharing 4 each (2.5% and 4.7%). Two incidents happened in the underweight out of the 31 procedures (6.4%) which may be of significance. It is interesting to note that the obese category did not suffer any incidents.[10]

VI. Conclusion

In this study our aim was to know the incidence of position related injuries and incidents in urological procedures under anaesthesia. We have observed that the incidence of injuries related to position is 2.1 % which is less than previous studies done on urological procedures. Most of the injuries reported were in the eyes and head like chemosis, periorbital edema lip edema. The only nerve injury which occurred was sensory neuropraxia where the patient complained of numbness in the lateral aspect of the left leg observed post operatively. The patient had undergone redo anastomotic urethroplasty under general anaesthesia. This was due to the long duration of procedure (> than 6 hours) in the lithotomy position.

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