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Original Article

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Pattern and Outcome of Blunt Trauma Due to Tear Gas Canisters: A Study from Kashmir Valley

Majid Mushtaque[1], Ajaz Ahmad Rather[2], Arshad Rashid[3]

Abstract

AIM: To study the pattern and outcome of blunt trauma due to tear gas canisters while controlling agitated mobs in Kashmir. *Methods*: A total of 82 patients with injuries caused by mechanical impact of tear gas canisters were studied in terms of anatomic site, severity and type of injury, treatment, and outcomes including morbidity and mortality. *Results*: Patients aged between 16 and 48 years. The most common sites of injury were the extremities (51.2%), abdomen (20.7%) and chest (18.2%). Seventy (52.63%) patients had minor or moderate injuries and were discharged within 12 hours. Twenty (24.3%) patients required an operative procedure. A total of three deaths (3.65%) were observed. *Conclusion*: Tear gas canisters can produce serious injuries by their direct impact that may even prove fatal. Injuries associated with tear gas canister should receive prompt management similar to that administered for severe blunt trauma and firearm-related injuries.

Keywords: Firearm Injuries; Tear Gas Shell; Tear Gas Canisters; Blunt Trauma; Riot Control Agents.

Introduction

Riot control agents are frequently used to control agitated mobs and for subduing barricaded criminals. They are highly potent sensory irritants of relatively low toxicity that produce dose and time-dependent acute site-specific effects. Collectively, these compounds have been referred to as 'harassing agents' or as lachrymators, and in common parlance they are known as 'tear gases'. Riot control agents are used in the form of sprays or as projectiles in the form of tear gas canisters [1].

Many reports of tear gas injuries have been published describing biological, physiological, and chemical/toxic effects of the gas on eyes, skin, respiratory and digestive tracts [2-4], but there are only few data published regarding the pattern, severity and outcome of injuries due to the mechanical impact of tear gas canister [5,6]. A persisting problem is the lack of medical recognition of the severity of injuries that can result from the direct impact of a tear gas canister, including, damage to the internal organs. To the best of our knowledge, this is the first study designed to evaluate the pattern and severity of the injuries caused by the mechanical impact of tear gas canisters and to find out the outcome in terms of morbidity and mortality.

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Material and Methods

This prospective study was conducted at three tertiary care hospitals in Kashmir, India. The data were obtained during the intermittent periods of civil unrest from June 2008 to December 2016. Thousands of patients were received in the Emergency Reception (ER), including those sustained firearm injuries (bullet injuries, tear gas canister injuries and pellet gunfire injuries), those who were injured by stone pelting and others by alleged beating by the security forces. Our study included only 82 patients who sustained tear gas canister injuries during the said period. Abstraction and information included the following: patient's age, gender, anatomic location, severity of injury as per Abbreviated Injury Scale (AIS), diagnostic studies, treatment, and outcome including morbidity and mortality.

Upon arrival to the ER, patients were examined; primarily treated with intravenous fluids, a dose of anti-tetanus toxin, prophylactic intravenous antibiotics and local care of the contact burns. They also underwent the obligatory scans including plain radiographs [cervical spine, abdominal, pelvic and chest] and focused assessment with sonography in trauma (FAST). They were then sent either directly to the operating room, observation/ disaster ward, or for additional studies such as computed tomography, doppler scan, or extremity X-rays, according to their condition, assessment and diagnosis. Patients diagnosed to have minor or moderate injuries (AIS1 & AIS2) were discharged within 12 hours.

Statistical analysis was done by Graphpad Instat version 3.10 for Windows [Graphpad softwares Inc., San Diego, California, USA].

Results

During the study period, 82 patients sustained tear gas canister injuries. There were 80 males and 2 females. Patients aged between 16 and 48 years. The most common sites of injuries were the extremities (51.2%), abdomen (20.7%) and chest (18.2%) [Table 1].

Table 1: Anatomical Site of the Injury *(n=82)*

Resident	Number	Percentage
Head & Neck	8	9.7%
Extremities	42	51.2%
Chest	15	18.2%
Abdomen	17	20.7%

A total of forty-two patients had injury to the extremities (lower limbs 26, upper limbs 16). All the patients had varying degrees of bruises with or without superficial burns. Twenty-six patients had minor or moderate injuries (AIS1 and AIS2) and were discharged within 12 hours. Soft tissue hematoma was noticed in 18 patients. Ten patients (23.8%) sustained extremity fractures (humerus 2, tibia 2, fibula 2, radius 4, ulna 2, scaphoid 4); out of which six patients had involvement of more than one bone.

Seven patients had vascular injuries (brachial in 2, popliteal in 2, and radial/ulnar in 3). Associated skeletal trauma was present in all the patients with vascular injury; and nerve injury was seen in 3 (42.8%) patients. Primary repair of vascular injury was possible in only one patient and reverse saphenous vein grafts were used to salvage the limbs in all others. Nerve injury in one patient was repaired primarily, while in the rest of two patients injured nerves were only tagged for future identification. Post-operative complications included wound infection in 2 and thrombosis of the graft in another patient which could not be salvaged and an amputation was necessitated.

Out of 17 patients sustaining blunt abdominal impact, bruises with or without superficial burns over abdominal wall were found in 10 (58.8%) patients. Five patients required an exploratory laparotomy. The intra-operative findings and surgical procedures done are shown in Table 2. Two patients with gut perforations (small bowel and sigmoid) had an associated mesenteric tear with additional bladder wall hematoma in the patient with sigmoid injury. One patient with liver laceration had an associated gastric wall hematoma.

Table 2: Intra-operative findings at laparotomy and surgical procedure done

Operative Finding	Number of Patients	Surgical Procedure
Liver laceration	2	Repair
Splenic laceration	1	Splenectomy
Mesenteric tear†	2	Repair in 1 and RA in another
Small bowel perforation	1	Primary repair
Colon (Sigmoid)	1	Exteriorization of the affected bowel.
Bladder wall hematoma †	1	
Gastric wall hematoma *	1	

† Associated with bowel perforations; * Associated with Liver Laceration in 1 patient.

In the eight patients with head and neck trauma, one was brought dead. The clinical findings included depressed skull fractures in 4 (including one brought dead), cephalohematoma in 4, scalp lacerations in 2 and swollen unilateral maxillo-facial region in 1 patient. Only 3 patients were fully conscious at the time of admission. Non-contrast computed tomography documented large contusions in 2 (parieto-occipital in one and frontal in one), small multiple contusions in 2, concussion injury in one and maxillary fracture in another patient. Associated subdural hematoma (SDH) was noticed in two patients with contusions. One patient had isolated extradural hematoma (EDH).

Operative procedures included decompressive craniotomy in two and evacuation of large contusion and EDH in one each of the patients. Fixation of maxillary fractures was done in one patient. Two patients with large contusions died in the postoperative period. Recovery was complete in 2 and partial in one patient. Two patients continue to be in vegetative state.

In 15 patients sustaining chest trauma, bruises with or without superficial burns were seen in 8 and rib fractures in 6 (multiple in 2 and solitary in 4) patients. Chest Radiograph/CECT chest revealed pneumothorax in two and haemo-pneumothorax in one patient, who were managed with intercostal chest tube drainage. One of the patients with multiple rib fractures had a flail segment, but did not require a ventilatory support. None of the patients required a thoracotomy.

The AIS Score depicting the severity of injuries is shown in Table 3. Fifty (60.9%) patients were found to have minor or moderate injuries. A total of 20 (24.3%) patients required an operative procedure. Three deaths (3.65%) were observed in our series which were due to head injury in all the patients. One patient had vascular graft complication and required below knee amputation. Wound infection and atelectasis were the most common post-operative complications occurring in 4 (20%) and 2 (10%) patients respectively and were managed accordingly.

Table 3: Abbreviated Injury Scale Depicted severity of injuries at various sites.

AIS	Extremities	Abdomen	Head & Neck	Chest
1	16	10	0	9
2	10	2	1	2
3	8	2	2	3
4	7	2	1	1
5	1	1	3	0
6	0	0	1	0

Discussion

Riot control agents also have been referred to as irritants or irritating agents, and incapacitating agents or short-term incapacitants [1]. A number of firearms have been used to control violent mobs in Kashmir over the last two and a half decades. These include conventional bullets, rubber bullets, pellet firearms and other riot controlling agents including tear gas canisters [7]. Tear gas canisters are the commonest modality for crowd control and are assumed to have a lower mortality. Tear smoke canisters are all-weather projectiles, developed as powerful irritant gas generators for crowd dispersal. Since World War I, some 15 chemicals have been used worldwide as tear gas agents [1]. Four of these including w-chloroacetophenone (CN), o-chlorobenzylidene malononitrile (CS), 10-chloro-5,10-dihydrophenarsazine, and a-bromo-a-tolunitrilehave been used extensively [2-4, 8].

The shell body of tear gas canister is made up of aluminium or heavy plastic and contains the irritant chemicals in pelletized form. The total weight of the canister is 275 + 5 gm, with an effective range of 135 + 10 m. It is launched by a single or a multi-barrel launcher which generate muzzle velocities of 50 m/s, producing a momentum of 13.5 – 14 Kg-m and a kinetic energy of 337.5 –350 J. The injury patterns that result from the direct impact of the tear gas canisters are due to the transfer of kinetic energy to the body that depends on the distance between the launcher and the victim. The gas produces temporary disablement of individuals by way of intense irritation of the mucous membranes and skin, while the direct impact can either produce minor trauma requiring local care in the emergency department or serious injuries, requiring admission to the hospital and frequently operative intervention. Burns due to tear gas canisters can result from either explosion near the victim, direct contact with hot canisters, or by the effect of the chemical powder inside the canisters [2].

In our series, the extremities were the most common site involved (51.2%). Lower limbs were more frequently injured (61.9%), probably due to their larger surface area. Fractures were, however, seen more often in the upper limbs (75% of fractures). This can be explained by the fact that the bones of the lower limbs are stronger, and there is a natural tendency of an individual to fend away the projectiles using one's upper limbs. Three of our patients with fractures were managed either by applying plaster caste or by closed reduction and external fixation; whereas 7 patients had associated vascular injuries were treated with open reduction and internal fixation. Peripheral vascular injuries were seen in 8.5% of our patients, which is in concordance with the data reported by Wani et al [6].

Seventeen (20.7%) of our patients sustained abdominal injury, of whom 5 (29.4%) required exploratory laparotomy for hemodynamic instability with free fluid in abdomen or radiological evidence of solid organ lacerations. These included the patients with peritoneal signs with or without free gas under diaphragm or a positive peritoneal tap. Three of our patients with blunt trauma had radiological evidence of a Grade II or Grade III solid organ injury (Liver 2, Spleen 1), but were hemodynamically stable and were managed conservatively. Liver was the commonest solid organ injured and was seen in 4 (23.5%) patients, of whom 2 required exploratory laparotomy. Abdominal wall bruising was seen in 10 (58.8%) of patients, however, it was present in all the patients who required exploration or had a radiological evidence of internal injury. Internal organ injury results only when a sufficiently high amount of energy is transferred to the body, inevitably, resulting in bruising of the skin at the site of impact. Liver and spleen are the two most common organs injured following blunt abdominal trauma [9]. Similar pattern was observed in our study.

Serious injuries with occasional long-term functional deficit can result from tear gas shell injuries to skull. Head trauma due to tear gas canisters poses a grim outcome. Lethal head injury can result from tear-gas cartridge gunshots [10]. Head trauma was seen in 9.7% of our patients. A mortality rate of 37.5%was observed in patients sustaining tear shell canister injuries to head; apart from long term functional deficit in another 37.5%. Wani et al reported mortality in 20% and long term functional deficit in another 20% of their patients sustaining tear gas cartridge injuries to head, although their study included only 5 teenagers [5].

In our series, chest trauma was seen in 18.2%. All the patients were managed conservatively; except three (20%), who required an intercostal chest tube drainage. No cardiac injury was seen in our series.

Conclusion

Tear gas canister, though considered to be a non-lethal modality of controlling agitated mobs, can in fact produce serious injuries by direct impact especially to head that may even prove fatal . Injuries associated with tear gas canister should receive prompt management similar to that administered for severe blunt trauma and firearm-related injuries. Personnel using them might be better trained so that the people do not receive close hits. While the external injuries may seem trivial, if not appreciated for the potential internal injuries, there can be catastrophic results.

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Review Article

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Robot-assisted Laparoscopy Surgery

Pratibha Singh[1], Meenakshi Gothwal[2], Garima Yadav[3], Navdeep Ghuman[4]

Abstract

A robot is a computer-controlled device that can be programmed to aid the positioning and manipulation of surgical instruments also. The goal of robotic surgery is to use a minimally invasive approach to perform procedures which are generally performed by laparotomy or are too complex for routine laparoscopy. There are certain advantages of robotic over conventional laparoscopy which include better imaging, mechanical improvement, stabilization of instruments within the surgical field, and improved ergonomics. The major advantage to the patient is a potentially shorter hospital stay, and more rapid postoperative recovery and return to full function. The limitations of robotic technology include high costs, increased operating room time due to large size of the devices and need for training. Surgical simulation, telementoring, and telepresence surgery are potential novel benefits of robotic technology. Further evaluation and implementation will determine the role of robot-assisted laparoscopy.

Keywords: Robotic Surgery; Minimal Invasive Surgery; Minimal Access Surgery; Robot Assisted Surgery.

Introduction

A robot is a computer-controlled device, which can be programmed for manipulation of surgical instruments which is generally used in minimal access surgery. After the introduction of laparoscopy, few limitations were felt by the surgeons like 2D vision, ergonomic limitations and difficult articulation in manipulation of instruments specially in prolonged surgeries. Robot-assisted laparoscopic surgery helps in overcoming these limitations, and hence improves patient care. It has all the benefits of minimal access surgery like smaller incision, less post pain, less hospital stay and early return to work.

United States-Food and Drug Administration [US FDA] has approved Da Vinci Robotic system for use in surgical procedures in 2000 and in gynecologic surgery in 2008 [1]. Da Vinci system has revolutionised the field of surgical robotics there has been a rapid increase in the robotic surgery all over the world including developing countries like India. However there have been few barriers to adoption of this new technology–cost, extra training requirement and lack of robust data. The role of robot-assisted laparoscopy will be reviewed here.

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History of Robotics in Surgical Speciatilies

Surgical robots can be passive - where they can be programmed preoperatively to guide for a surgical target, these movement can be autonomous or [eg Probot] or it can be used for navigational aid for precise positioning. Surgical robots can be active where it is used for intraoperative surgical manipulation of instruments by the surgeon.

First robotic surgery was in 1985, where PUMA 560 was used to orient a needle under CT guidance for a brain biopsy [1]. PUMA was the first system to be approved by US FDA. Robotic surgery soon extended to other fields like urology (1988, Probot), orthopedics (1992, Robodoc), and gynecology (1998, Zeus) [1,2].

US FDA approved the AESOP [Automated Endoscopic System for Optimal Positioning], a laproscopic camera holder in 1994 for abdominal surgery; later a voice controlled system was used. These systems are no longer in use. The introduction of da Vince surgical system by Intuitive surgicals has revolutionised the surgical robotics. It was developed by Stanford Research Institute and National Aeronautics and Space Administration [2]. It was originally designed for military to provide surgical care to soldiers in battlefield form a remotely controlled surgical area. It was approved by US FDA in 2000; since then there has been a steep rise in the number of sale of da Vinci system and the number of robotic surgery across the globe.

Conventional Surgery Versus The Mininal Access Surgery

Conventional open surgery is time tested modality of treatment for many conditions. However as the technology for optics, camera and instrumentation has improved, laparoscopic surgery came with obvious advantage of significantly smaller incisions and better cosmosis, less pain, less bleeding, magnified view, early recovery etc. It was accepted with some skeptism and was initially criticised by many. Gynecologist were the first to embrace it and diagnostic laparoscopy and tubal ligations were accepted early. The first operative laproscopic surgery was laproscopic appendicectomy and was done by a Gynecologist Kurt Semm. Since then, as the technology became available to many, many more surgeons were trained in laparoscopic surgery and it was then accepted world over as a standard of care for many conditions. However it required mastering certain tasks eg hand-eye coordination, 2D vision, lack of haptics etc. Suturing and knot-tying, retroperitoneal dissection requires advanced surgical skills which are difficult to master. Poor ergonomics can lead to fatigue or joint strain in the surgeon, and prolonged surgery can be taxing for the surgeon [3]. In case of any difficulty in laproscopic surgery open surgery is savior. As the time has passed significant improvements have occurred in laproscopic surgery, both in technology and our skill and confidence in using them. Its safety and efficacy in undoubted now for many benign and malignant surgical procedures. It is still needed to choose laproscopic surgery carefully taking into account of the patient profile and the best possible treatment option to them.

Robotic Versus Other Surgical Approaches

Robotic assisted surgery is a type of minimal access surgery. Conventional laproscopic surgery and robotic laparoscopy share similar advantages over laparotomy, like significantly less morbidity, faster recovery, and smaller incisions. However both of these minimally invasive routes have similar potential to cause trocar injuries, insufflation related problems, abdominal wall hematomas at trocar sites when compared with laparotomy. There is slightly increased risk of bladder and ureteral injury with laproscopic and robot-assisted laparoscopy compared to open surgery as energy sources are used more commonly with both these methods [4].

Difficult laproscopically surgical tasks eg suturing and knotting, retroperitoneal dissection which are difficult to master with laproscopic surgery can be learnt and performed with robotic platforms much easily.

Advantages of robotic surgery

Robot-assisted surgery scores over conventional laparoscopy in many ways [5]:

Superior Vision: A robotic system provides a 3 dimensional view; camera can be rapidly zoomed to the area of interest by the surgeon himself without asking the assistants to do so; this allows the surgeon to have full control over the vision of the surgical field, while a conventional laproscopy has a 2D vision. Newer techniques for 3D vision are now being incorporated to laproscopy too but with a significant increased cost.

Mechanical advancement: Robotic instrument are far advanced as compared to laproscopic instruments. Instruments are introduced through the trocar in the abdominal wall, which acts as a fulcrum. This fulcrum effects puts a torque at the abdominal wall and the instruments which is further increased in obese patients. This leads to more tension on the instruments and hence more chances of breakage. Robotic instrument are introduced through the trocar too which are held in position by robotic arms, so much less torque is produced at the abdominal wall. This leads to less pain in the post-op period and less damage to instruments. Thin 3-5mm laproscopic instrument fracture more frequently due to this torque.

Wrist like movements: “Endo Wrist” movement in robotic hand ins of movement is very much similar to human hand. This facilitates suturing, hence suturing is easier to learn and do on robotic platform. Traditional laproscopes have 4 degrees of freedom, so learning and mastering suture and knot tying is difficult with a long learning curve. Surgeries which require lot of suturing and tying is difficult on conventional laproscopy while it is much easy to master on a robotic platform. Nowadays some laproscopic instruments are coming with few additional movement features, however it requires additional training.

All electrosurgical instrument are wristed in robotic platform while in laproscopy this function is available only with very few instrument.

Lessening of tremor: In conventional laparoscopy, small movements by the surgeon are amplified (including errors or hand tremor). Robot-assisted surgery minimizes surgeon tremors.

Instinctive hand movements: Hand movements are counter intuitive in laproscopy, if a surgeons has to lift up something he /she depresses her hand so the instrument goes up; this direction of movement is counter-intuitive to natural instincts. In robotic surgery hand movements are intuitive and in same direction as natural instinct; this makes faster with a small learning curve.

Ergonomic Improvement: Docking requires some additional time in robotic surgery than laproscopy. But with the newer 'Xi system' docking is easier and tak at the console while operating with robotic systems. This avoidance of long-term standing during surgery may be particularly helpful to surgeons who are pregnant or have orthopedic limitations [5,6].

In a study, 8-12% surgeons reported pain and numbness in their arms, wrists, or shoulders after performing conventional laparoscopic gastrointestinal surgery [8].

Limitations of robotic surgery

There are some limitations of robotic technology too [5,8]:

Instrumentation cost and limited uses for instrumentation: The cost of robotic surgical equipment is dependant on many factors eg- model type, spare hand instrument purchased, number of trainings for surgeon and Ot staff, single or dual console etc. For Developing countries like India the cost of procuring equipment and their recurring cost is too high; also each instrument is limited to 10 uses, and cost per instrument is very high. Cost-effectiveness of robotic surgery versus the conventional laproscopy surgery does not favours the robotic platform presently. One reason for this could be- it is presently being manufactured by a single company hence the cost is high; in near future as more companies will be manufacturing this equipment cost is likely to come down. Many other companies are like to come in market in coming years.

Additional training: for surgeons, technician and nursing staff.

Bulkiness of the devices hence need for bigger OT.

Lack of touch sensation or haptics just like laproscopy (tactile feedback)

Risk of mechanical failure: As with any other electro-mechanical device there is always a risk of mechanical failure and the instrument going haywire and causing injury to patient. Though the instrumentation goes to many quality checks and is smart enough to detect many of the problems/ or failures, the theoretical risk always remains there.

Limited vision to an area of abdomen: The older da Vinci systems required de-docking, repositioning and re-docking if more than 1 or 2 quadrants of abdomen we needs to be redocked if more than 1-2 quadrants are to be operated upon.

ROBOTIC Surgical equipment

The most widely used system is the da Vinci system. Equipment for this system includes [9]:

Surgeon's console (3D video screen, hand and foot controls so the camera, hand instrument and energy source can be controlled. It has a built in safety feature which allows the instrument activation only when surgeons head is put in the vision box. Surgeon can toggle between the instrument [Fig. 1]

Surgical cart (3-4 robotic arms on a boom, this boom can rotate and can go up and down for positioning at the patient end.) [Fig. 2]

Equipment cart (camera, light source, energy devices- electrocautery)

Fig. 1: Surgeons console

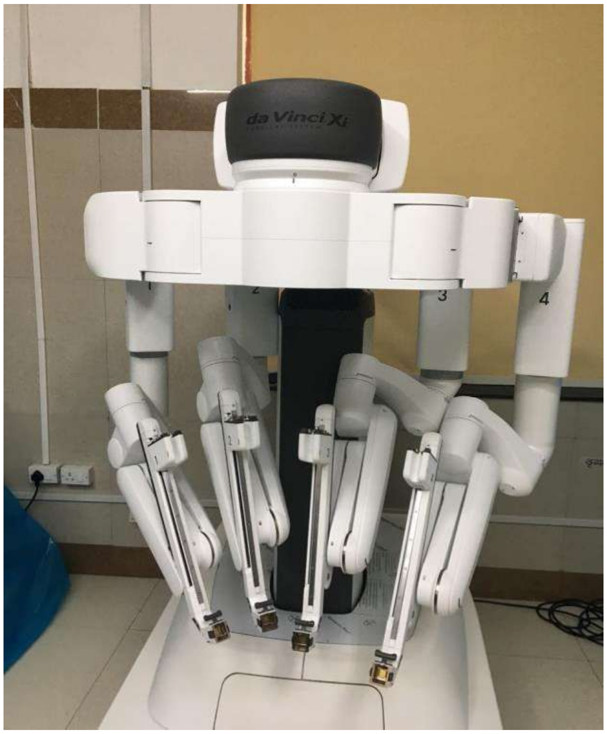

Fig. 2: Robotic arms with boom

Robotic Operative Procedure

Initially, the patient is positioned and prepared similarly to conventional laparoscopy. General anesthesia is given and verees needle is used to create pnemo-peritoneum, trocar is inserted [newer da Vinci system uses 8 mm port for camera as well as hand instrument]. Trocar is generally positioned at 15-20 cm from the target anatomy. Other ports are introduced 6-8 cm apart to allow for free movement of robotic arms on the left or right side of the central port. Assistant port can be chosen of 5-12 mm port size depending on which instrument would be required from the assistant surgeons. OT table can be tilted / moved prior to docking, and once robotic arms are docked on trocars, operating table cannot be moved. Ports are placed perpendicular to the abdominal wall in the newer robotic system so that it can be moved in any direction if other quadrant abdominal view/ surgery is needed. Earlier system required the ports to be placed at 15-30 degree angle, at 8-10 cm lateral to the camera port, this distance between ports is needed to avoid collision of the robotic arms.

A conventional accessory port is needed for suction/irrigation, introduction of sutures, removal of specimens etc; and is placed on the left or right side of the patient, superior and medial to the ipsilateral robotic accessory port. 8 mm ports can accommodate sutures with small half-circle (SH) needles and does not require fascial closure; this reduces musculoskeletal pain in the post-operative period.

The robot tower which has robotic arms is placed between the patient's legs, or centrally docked depending on the surgery being performed. Newer robot models can be "side docked" and allows free access to the lower abdominal quadrant and pelvic structures (eg, vagina, perineum). Older system required the robot tower to be positioned at 45 degrees to the patient's left or right leg stirrup or in parallel to the patient's bed. [6] For gynecologic surgery, side docking improves access to the vagina and perineum and reduce assistant fatigue and the potential for injury due to a collision with the robotic arms. Newer Xi Da Vinci system allows for easy positioning of the patient cart, with the boom rotating easily making docking easy and quick simplifying multiquadrant surgeries. Thin arms of the newer system allows for a greater range of motion and more flexibility

The surgeon is then seated at a console, views the operative area with a binocular vision system, and places hands on the hand controls. Height of Arm rest and view box can be adjusted and saved according to the surgeon'spreference and comfort. Hand 'masters'then translates the movements of the surgeon's hands into an electric signal which goes to the surgical cart and activates the robotic arms. Generally a ratio of 3:1 is used for movement of surgeons hand to the movement of robotic arm. Filter reduces the tremors of surgeons hand and allows for an efficient surgical manipulation and suturing. The surgeon can swap between the instruments. Foot pedals controls the camera, energy device and swapping of instruments.

The dual console system improves a surgeon's ability to teach a junior or trainee because both surgeons are able to sit at a console simultaneously, visualize the operative field in 3D, and swap control of various instruments. This function is specially helpful in medical colleges where teaching and training is a norm. Surgeon can control what all function he wants to give to his trainee allowing for a precise control over the movements of his trainee.

Newer systems employ optics that can provide high definition (HD) vision in three dimensions. Each instrument passes through a reusable 8 mm system-specific port [4]. Some robotic ports have valves, which allow insufflation through the robotic trocar.

Hurdles in implementing a robotic surgery: Major obstacles to the clinical use of robots are cost, extra training required [surgeons, technician and nursing teams], and lack of clear outcome data [5, 7,10,11]. There is no doubt that robotic technology is promising for the surgeons across all specialties to gain competence in complex minimal invasive procedures. This is particularly useful for surgeons who did not had advanced training or experience in complex conventional laparoscopic procedures that involve laparoscopic suturing, knot-tying, ureterolysis, retroperitoneal dissection etc.[11,12]

Robotic surgery in surgical training programs: Robotic training programs have become part of many surgical residency and fellowship programs in western countries, but such training is not standardized or essential. Currently, there are no guidelines or standard requirements for robot-assisted laparoscopy training in residency in other parts of the world [13]. Currently Intuitive surgicals asks to complete the on-line training module with >80% score, this is followed by 1-2 day training in a dedicated lab. This is followed by on site surgical proctoring of 3-5 cases [number is not fixed by the company] and is left to the credentialing hospital [13,15]. Additionally, there are five robotic training modules that must be completed online as part of the training. In India and many developing countries robotic surgical platform is available in a handful of government medical institutes; and still has not been included in surgical residency training.

Although there is a reliable and validated instrument that can be used to assess technical skills in performing robotic surgery (robotic objective structured assessment of technical skills [ROSATS]), it has not been widely adopted [13,14,15].

The surgeons must regularly do cases after acquiring the training to master the skills and should do cases regularly do maintain his/her skills. Many institutions are imposing a certain volume of cases so that surgeons maintain a competent skill level, however the individual variation in acquiring the competent skill level, makes an arbitrary number very illogical. Surgical learning requires adequate number of cases and the time interval in these procedures. It is also suggested that every specialities should develop how much time would be needed for acquiring specific tasks needed for every specialities. Proficiency in a new skill includes both the procedure and the ability to manage the complications. Safe surgical practice depends on surgical volume too, most agree that it is important that one should be proficient in open surgery before attempting robotic surgery, and if the procedure is performed exclusively laproscopically than the surgeons has to be competent in that field.

Cost-effectiveness of Robotic surgery: Cost of robotic surgery include capital required for acquisition of surgical robot, limited use instruments, team training expenses, equipment maintenance, equipment repair, and operating room set-up time. Results of cost-effectiveness analyses vary by whether single-procedure or overall robotic costs are included and by a hospital's surgical volume [10,11].

Robot-assisted cases [for hysterectomy] cost approximately $2000 more per case than the same procedure performed by conventional laparoscopy and varies greatly with the number of instrument used in each surgery. In the era of health care reform, and for developing nations this elevated cost may be the greatest hindrance to implementation of robotic surgery. Till cheaper robots are available this cost is likely to remain high and the benefits may not be passed to the general public. More prospective studies are required to analyze overall costs (direct and indirect) of robot-assisted procedures to health care systems before it is translated to clinical practice. Further studies are warranted to look into all these aspects.

The Future: Telerobotics in education and simulation:

Surgical simulation, telementoring, and telepresence surgery are potential novel emerging fields of robotic technology.

Robotic simulation could allow rehearsal of procedures with the potential for reduction in complication rates and learning curves, and even for the development of new technical approaches.

Telementoring provides the ability for an experienced physician at a remote site to be able to mentor a less experienced surgeon in training or in real time. The ability of a distantly located surgeon to perform surgery on a patient is exiting and opens the newer avenues of application of robotic surgery in future. Physical distance between an expert surgeon in a telementoring or telepresence set-up requires safeguards in case of mechanical failure or surgical complication (eg, latency of signal from mentoring to operating surgeon, redundancy of internet lines), although these have not yet been established [16,17]. The speed of information transmission is a key element in telepresence surgery. Surgeons are able to complete tasks with a delay in operating room to console signal transmission of up to 500 milliseconds. The US Food and Drug Administration requires that all operations using a telerobotic system are performed in the same room as the patient.

Conclusion

Robotic surgery has progressed rapidly all over the world in the last decade; it has been well accepted and adapted by surgeons across the globe due to its edge over the conventional minimal access surgery. It can overcome the limitations of the conventional laproscopic surgery, and has the prospective to expand its horizons further. Presently its high cost precludes its use in everyday surgery, and its availability is limited to bigger cities only. If only the cost can be taken care of, it has the potential to expand its use in every part of country with all the benefit passing over to the patients.

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Administrative Model for Medical College Students

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Abstract

In India the students comes for education from various places of world. Also in our country- India there is quite different geographical areas of different culture and languages. Our population is so high with different economical backgrounds and social taboos. In all over medical colleges of India this type of student diversity is very common. There is cultural, social, economical, language, demographic differences which plays the important role on medical college students' life as well medical college administration. In medical college students come with different level of knowledge, intelligent and emotional quotient also difference in the family background. Most of the students are from parents of doctor family, businessman to daily wages and farmers. In order to make balance in this problem medical college has to play very crucial role. Medical college administration cannot be biased, should not discriminate according to above parameters including gender discrimination.

Keywords: Administrative Model, Medical College students.

In India the students comes for education from various places of world. Also in our country- India there is quite different geographical areas of different culture and languages. Our population is so high with different economical backgrounds and social taboos.

In all over medical colleges of India this type of student diversity is very common. There is cultural, social, economical, language, demographic differences which plays the important role on medical college students' life as well medical college administration.

In medical college students come with different level of knowledge, intelligent and emotional quotient also difference in the family background. Most of the students are from parents of doctor family, businessman to daily wages and farmers.

In order to make balance in this problem medical college has to play very crucial role. Medical college administration cannot be biased, should not discriminate according to above parameters including gender discrimination.

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For this purpose I have made and successfully implemented new model of administration regarding medical college students in Dr. Vithalrao Vikhe Patil Medical College, Ahmednagar, Maharashtra (India) 414111.

The following are the components with their role and function in administrative model:-

1. For very batch of M.B.B.S. and Post graduate students separate male/female teaching staff of professor or associate professor cadre is appointed for boys and girls respectively. i.e. near about 50-75 boys/girls there are one male and one female teacher co-ordinator.
2. Then male/female assistant professor/tutor cadre is appointed under this male/female batch co-ordinators as a assistant batch co-ordinators for every 10 boys and girls respectively.
3. All batch male /female batch co-ordinators and assistant co-ordinators made a WhatsApp group of boys and girls respectively.

   The main aim of this WhatsApp group is that

   A. Each and every student is 24 by 7 connected to dean, batch co-ordinator and assistant co-ordinators.

   B. One can share and wish success and birthdays also participate in painful events.
4. Every Saturday afternoon all the students meets to assistant batch co-ordinators for 30-45

min for any problems to which they are facing

5. Every last Saturday of month in afternoon there is meeting of Dean, batch co-ordinators and assi.co-ordinators for same above purpose.
6. Annually there is “Parent teacher meeting” which will be decided and coved three months before the function so that parents can do their reservation at proper time
7. In between also whenever any parents or relative of students comes to campus they are advised to meet dean, concerned teachers, batch co-ordinators and Assi. Co-ordinators.
8. Every visit record is kept by co-ordinators including weekly and monthly as well as annual parent teacher meet. Concerned parent’s signature, contact details, discussion topics also kept on separate form in box file.
9. For every student I have tried to take name, address and contact details of local guardian with visit details.
10. Every day in dean office five students are called randomly at 4; 30 PM for formal well as informal talk in order to reduce the stress and phobia related to medical profession.

Of course there is most significant role of management, vice-principal, head of departments and all teachers in student’s medical life.

By this model following curricular, co-curricular and extracurricular activities are successfully implemented in addition to Medical Council of India and Maharashtra University of Health Sciences, Nasik.

- Integrated teaching meet- this involves participation of each year UG and PG students on one common topic quarterly and certificate of participation is given to them. Also each meeting is judged by three eminent professors as a judges and annually three students are given prizes. e.g.- Diabetes mellitus, hypertension, jaundice etc
- Clinical meet- interesting cases are presented by PG students monthly from all departments and certificate of participation is given to them. Also each meeting is judged by three eminent professors as judges and annually three students are given prizes.
- Academic cell- those students are slow learners for those extra classes are conducted after college hours and holidays same is arranged separately for brilliant students.
- Research cell- helps in paper and poster publication. Monthly there is research meet with presentation of one patent, poster, paper, PhD dissertation by Teaching staff and PG students with one scientist of month is presented by undergraduate student. Certificate of participation is given to them. Also each meeting is judged by three eminent professors as judges and annually three students are given prizes.
- Wall magazine- we have wall magazine for co-curricular and extracurricular activities with any topic concerned of that particular month. Also there is KAVI-SAMELAN, Poetry, essay competition. to help in participation of state, national and international competitions
- Cultural committee for annual social gathering and Ganpati festival arrangement
- Sport committee for indoor and outdoor games, to help in participation of state, national and international competitions
- Nature lover’s club- in order to decrease the stress and strain of medical studies every weekend outdoor trip is arranged for bird, animal, tress and jungle observations. This club conducts nature photography competition with attractive prizes annually.
- Compititative exam cell- those who wants to join civil services, USAMBLY, TOFEL special classes and lectures are conducted regularly.
- Spiritual (Holy) club- irrespective of cast and religion all students are delivered holy/ spiritual lectures bimonthly.

Along with this as recommended by Medical Council of India and Maharashtra University of Health Sciences, Nasik all other activities like, NSS, MET, HSETU, Avishkar, Spandan etc activities are regularly conducted.

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Effective Communication in Clinical Practice and Teaching

Pratibha Singh

Abstract

Communication is a spontaneous essential component in human behaviour. Professional communication requires skill and expertise which needs to be learned and practiced. Effective communication builds a strong doctor-patient relationship and is essential in gaining trust and confidence. Key areas for effective communication for physician is discussed here..

Keywords: Communication; Clinical Practice; Doctor-Patient Relation.

Clinical practice requires effective communication by the treating doctor with the patient and family members. Effective communication wins the physician the confidence and respect of patients and their relatives and helps build a healthy doctor–patient relationship. These soft skills can be learned during the graduation and post graduation years and then practiced to perfection.

Communication skills ina teaching Institution is one of the most important skills that physicians in academic and community practice shouldstrive to acquire. Often this skill is not formally taught but is caught be observing seniors. Serious disasters in effective communication between physicians and patients & their relative can lead to disastrous results; often culminating in misbehaviour and hostility towards doctors. News in media regarding misbehaviour of patient's attendants and medical fraternity often results for a trivial cause, culminating in violence against doctors. In medical colleges sometimes we hear stories of unproductive communication among physicians speaking to each other.

One of the common failure in communicating information is due toinaccurateor inattentivelistening. Misunderstandings may result if an individual fails to comprehend what is being said either explicitly or implicitly. This then requires prolonged dialogue and discussion and before resolution is achieved. We all have witnesses, confusion resulting when careful listening is not practised.

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So, how does one learn to effectively communicate? First step toward this is by listening effectively, which requires a conscious effort by the listener in order to understand what the speaker is trying to communicate. This actively listening needs focussed effort by the listener. If the listener is distracted by thoughts or smart phone which we see commonly today; the message other is trying to give will not reach us completely or might be misunderstood. Patient may perceive it as irritation or may not be able to confide in you and may not give important information which may alter the diagnosis or management. We can put ourselves in patients shoes and if my treating physician is distracted by phone is not paying attention to what is being said it will definitely irritate me, and I may have the opinion of doctor being discourteous! Focussing one's attention actively and consciously on what is being said by the patient is the first step towards effective communication.

Too much use of technical words or jargons with a person not conversant with those terms is a clear sign of communication failure. Simple language and commonly used words preferably in local language will make the patient and their relatives understand the disease, treatment options and complications should they arise. Use of abbreviations or short forms often leads to confusion for the layman, and hindrance in understanding. Each failure interferes with effective communication and understanding.

Healthcare team should communicates with patient and their relatives in easy to understand language avoiding abbreviations and technical jargons.

Patient often asks questions related to diseases or treatment involved;It is important to listen the questions carefully, and then answer them appropriately. If the questions are not clear, clarification or repeating the question may be asked for and then appropriately answered. Often patients say, "Doctor did not answer my questions" which brings a bad name to the treating physician. Communication with a sick patient and their relatives requires special skills and involves multiple of issues beyond the mere telling of facts or figures. It is important to focus on patients expression, speak slowly and in a easy to understand language avoiding too much of technical words which are difficult to understand. Making the patient comfortable and sit while talking to him/her shows respect for the individual and is well perceived by the patient too. Breaking bad news to patients also needs skill in dealing such difficult situation.

Compassionate attitude of the treating doctor brings a lot of satisfaction and trust, and is potentially helpful for preventing misbehaviour.

Medical students often pick up these skills by observing their seniors and teachers; so it is important to become a good role model for them. Nowadays many colleges have included how students communicate with patients in their performance assessment.

Inter-departmental consultations are frequently needed in hospitals. Clinical response in such cases should be restricted to the reasons consultation is asked for and communicated in legible handwritings. With patient data and case records becoming electronic at many places over the world, problem of illegible handwriting is taken care of.

In the teaching colleges or conferences doctors are frequently giving scientific deliberations with a power point presentation. Medical college doctors are taking lectures and clinical classes for their graduates and post-graduate students. It is important to look professional in their appearance and their communication, so that they become a role model for the young aspiring doctors. If teaching is being done with help of power point presentations it is important to keep slides simple, and not everything is written on slides and one just reads out what is written!. If the slide is full of sentences, and cannot be read from a distance, it fails to convey the message it is desired to do. Keeping it simple with 5-6 sentences per slide and a readable size of letters or font should be practice. Also the pace of speaking should be appropriate for the audience, too fast or too slow may miss the point one wants to convey in his/her scientific deliberations.

In conclusion, effective communication is skill that needs to be inculcated in every medical student, needs to be constantly worked upon. Active listening, simple language, empathy, avoiding medical abbreviations and jargon, and responses/answers tailored according to patients understanding and needs are helpful methods for effective communication with patients and their relatives.

Early and conscious learning by the medical student in their graduation and post-graduation by observing and practicing will make them proficient in this required essential skill. This skill is needed throughout their medical career.

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Legends: Legends for the figures/images should be included at the end of the article file.

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The second page should carry the full title of the manuscript and an abstract (of no more than 150 words for case reports, brief reports and 250 words for original articles). The abstract should be structured and state the Context (Background), Aims, Settings and Design, Methods and Materials, Statistical analysis used, Results and Conclusions. Below the abstract should provide 3 to 10 keywords.

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The methods section should include only information that was available at the time the plan or protocol for the study was written such as study approach, design, type of sample, sample size, sampling technique, setting of the study, description of data collection tools and methods; all information obtained during the conduct of the study belongs in the Results section.

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Discussion

Include summary of key findings (primary outcome measures, secondary outcome measures, results as they relate to a prior hypothesis); Strengths and limitations of the study (study question, study design, data collection, analysis and interpretation); Interpretation and implications in the context of the totality of evidence (is there a systematic review to refer to, if not, could one be reasonably done here and now?, What this study adds to the available evidence, effects on patient care and health policy, possible mechanisms)? Controversies raised by this study; and Future research directions (for this particular research collaboration, underlying mechanisms, clinical research). Do not repeat in detail data or other material given in the Introduction or the Results section.

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Standard journal article

1. Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. J Oral Pathol Med 2006; 35: 540-7.
2. Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. Acta Odontol Scand 2003; 61: 347-55.

Article in supplement or special issue

3. Fleischer W, Reimer K. Povidone iodine antisepsis. State of the art. Dermatology 1997; 195 Suppl 2: 3-9.

Corporate (collective) author

4. American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. J Periodontol 2000; 71: 1792-801.

Unpublished article

5. Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure. Dent Mater 2006.

Personal author(s)

6. Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

Chapter in book

7. Nauntofte B, Tenovuo J, Lagerlöf F. Secretion

and composition of saliva. In: Fejerskov O, Kidd EAM, editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. p. 7-27.

No author given

8. World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

Reference from electronic media

9. National Statistics Online—Trends in suicide by method in England and Wales, 1979-2001. www.statistics.gov.uk/downloads/theme_health/HSQ 20.pdf (accessed Jan 24, 2005): 7-18.
Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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