

# Algiatry: Role of Anaesthesia & Radiology in Relation to Pain Management – An Overview

Priya Ramchandran<sup>1</sup>, Sandeep Sharma<sup>2</sup>, Shweta Sharma<sup>3</sup>, Shashi Sharma<sup>4</sup>, Tanu Singh<sup>5</sup>, Meghna Varma<sup>6</sup>, Bharat Bhushan Sharma<sup>7</sup>

<sup>1</sup>Speciality Registrar, Department of Anaesthetics (ST5) University Hospital, Coventry & Warwickshire, Coventry, CV22DX, UK

<sup>2</sup>Specialist Doctor Department of Anaesthetics, Heartlands Bordesley Green East, Birmingham, B95SS, UK

<sup>3</sup>Specialist Doctor, Department of ENT, University Hospital, Coventry & Warwickshire, Coventry, CV22DX, UK

<sup>4</sup>Professor, Department of Pediatrics, SGT Medical College Budheraa, Gurugram 122505

<sup>5</sup>Assistant Professor, Department of Radio-diagnosis, SGT Medical College, Budhera, Gurgaon, 122505

<sup>6</sup>PG Resident, Department of Radio-diagnosis, SGT Medical College, Budhera, Gurgaon, 122505

<sup>7</sup>Professor & HOD, Department of Radio-diagnosis,SGT Medical College,Budhera, Gurgaon, 122505

Received: July 2020

Accepted: July 2020

## ABSTRACT

**Background:** Algiatry is a discipline in the medical field which is concerned with prevention of pain. This also covers the evaluation, treatment and rehabilitation of the person in pain. Pain management has a multi-model approach where the role of anesthesiologists, surgeons, physicians and psychiatrists is well recognized. The subject should cover both palliative and curative approach. The role of radiologists is becoming more significant with a growing trend towards interventional procedures. The subject of pain has got a variety of background description covering both the diagnostic as well as therapeutic procedures. **Methods:** Forty eight patients having 32 male and 16 females were subjected to the questionnaire who underwent procedures in our institute as per our institutional guidelines for algiatry. The mean age of our patients was 32 years. **Results:** It was noticed that the majority of the patients were comfortable. **Conclusion:** The role of anesthesiologists and radiologists co-working includes safe sedation, analgesia and anesthesia as per the demand. The outcome should be of maximum benefits and with almost minimal side effects. The hospital stay is minimized in therapeutic cases and the complicated surgical manipulations are avoided.

**Keywords:** Algiatry, Pain, Palliative, Curative, Interventional Procedures

## INTRODUCTION

In radiological practice, sedation and analgesia are essential components of various procedures especially in therapeutic population. There has been a huge paradigm shift from invasive surgical procedures to minimally invasive techniques in the modern medical practice. There is a requirement of a competent team for sedation and analgesia under this new sub specialty.<sup>[1]</sup> More stress is being laid to minimize pain due to various etiological factors. Analgesia and sedation should be effective and the patient should remain comfortable during the procedures. The anesthesiologist should have thorough knowledge of the pharmacology of drugs used for sedation and for pain management. The whole scenario should be focused on safety, comfort and success of procedure. There is different protocol for pediatric and adult patients and the modifications have to be done as per the requirement.<sup>[2]</sup>

### Name & Address of Corresponding Author

Dr. B B Sharma  
Professor & HOD  
Department of Radiodiagnosis,  
SGT Medical College, Gurugram Haryana  
A 6/7, Vasant Vihar, New Delhi - 110057  
Email: bbhushan986@gmail.com

## MATERIALS AND METHODS

We interviewed 48 patients before and after the procedure from the period of January 2019 to December 2020. This comprised of sixteen females (33.3%) and thirty two male (66.7%). The mean age was 37 years. The youngest was a 20 year old boy and the eldest was a 69 year man. These patients were falling in the group of diagnostic and therapeutic procedures. There were 32 patients in the former and 16 in the later. Diagnostic group of 32 included 12 (23%) female and 20 (77%) male. Therapeutic group included 4 (25%) females and 12 (75%) male [Table 1]. We did not include the preventive group as that was not of clinical relevance in this study.

**Table 1: Distribution of patients as per diagnostic and therapeutic categories.**

Diagnostic procedures Total=32 [12 F (23%), 20M (77%)]		Therapeutic procedures Total=16 [4F (25%),12M(75%)]	
HSG	3	PCN	3
IVP	3	PTBD	2
MCU	4	Nerve Block	2
CT	3	Pleural effusion tapping	6
MRI	7	Intra articular injections	3
US	8		
TVS	4		

All the cases were included irrespective of their earlier experience about the procedure or not. The details of the questionnaire and the response of the patients has been given in [Table 2]. It was observed that the institution protocol with the team of anesthetist and radiologists, there were very few problems regarding pain which the team came across. The major gain was that the pain felt during the procedures was alleviated with proper instructions to the patients and after following the guidelines which have been given in [Table 3].

**Table 2: Questionnaire and the response of our patients who underwent the procedures**

Sl No	Diagnostic Questions (n=32) (as per table 2)	No of patient	Response	Remarks	Therapeutic (n=32) (as per table 2)	No of patient	Response	Remarks
1	Have you undergone this examination earlier or this is first time?	8/24	a) Yes b) No	Institution protocol followed	Have you undergone this examination earlier or this is first time?	3/13	a) Yes b) No	Institution protocol followed
2	Was this investigation/intervention painful?	15/32	a) Not painful b) Painful (tolerable) c) Painful d) Very painful	Institution protocol followed	Was this investigation/intervention painful?	6/6	a) Not painful b) Painful (tolerable) c) Painful (intolerable) d) Very painful	Institution protocol followed
3	Was the procedure as were your expectation as benefited earlier?	15/15	a) Less comfortable b) As expected c) Worse	Institution protocol followed	Was the procedure as were your expectation as benefited earlier?	4/8	a) Less comfortable b) As expected c) Worse	Institution protocol followed
4	How can you compare with the dental care?	5/18	a) Less painful b) Comparable c) More painful	Institution protocol followed	How can you compare with the dental care?	8/6	a) Less painful b) Comparable c) More painful	Institution protocol followed
5	How can you compare with the normal blood sampling?	20/10	a) Less painful b) Discomfort c) Worse	Institution protocol followed	How can you compare with the normal blood sampling?	4/4	a) Less painful b) Discomfort c) Worse	Institution protocol followed
6	Was the radiologist/ doctor involved was concerned about your pain?	25/7	a) Yes b) Don't know	Institution protocol followed	Was the radiologist/ doctor involved was concerned about your pain?	12/4	a) Yes b) Don't know	Institution protocol followed
7	Any post procedural discomfort noticed?	18/14	a) No b) Mild	Institution protocol followed	Any post procedural discomfort noticed?	12/4	a) No b) Mild	Institution protocol followed
8	Have you been called again to repeat the test?	30/2	a) No b) Yes	Institution protocol followed	Have you been called again to repeat the test?	14/2	a) No b) Yes	Institution protocol followed

**RESULTS**

Majority of the patients had undergone the procedures for the first time because of the location of the institute is in rural belt. The incidence was slightly higher side among therapeutic patents (81.5%) as compared to the diagnostic component (75%). Diagnostic patients complained the procedure as less painful (6.25%) as compared to therapeutic (25%). The incidence of post procedural explanation was different in both categories. 25% (n=4) of therapeutic category were not expecting as they had been briefed as compared to 6.25% in other group. Pain was compared to dental extraction and was noticed more in therapeutic side (38.1%) as compared to diagnostic side (28.1%). More patients were called again in therapeutic side (12%) as compared to 6.1% in diagnostic side. The results had been tabulated in Table 2. It was noticed that the majority of the patients were comfortable.

**DISCUSSION**

The subject of pain management is gaining more importance as there is exponential increase in the

number of patients undergoing interventional therapeutic and diagnostic procedures. It becomes even more important when the sedation is to be dealt by non-anesthetist. The main aim is proper training by anesthetic team for the drugs usage in minimal and moderate sedation.<sup>[3]</sup> Anxiety and pain caused to the patient during interventional procedures requires anesthesiologists' support. Also, the pediatric population needs to be rendered motionless whilst undergoing interventional procedures.<sup>[4,5]</sup> These two situations bring the two specialties of Radiology and Anesthesiology together.

**Table 3: Institutional guidelines for various diagnostic and therapeutic procedures about algia**

Diagnostic procedures	Remarks	Therapeutic procedures	Remarks
HSG (Hysterosalpingography)	Radiologist collaborates with gynecologist. Topical anesthesia and locally injected anesthesia with tramadol may reduce the pain.	PCN (Percutaneous nephrostomy)	Done by trained interventional radiologist. Done under local anesthesia with post procedural routine analgesics
IVP (Intravenous pyelography)	Painless procedure except IV line. Analgesia/hypnosis can result by decreasing renal function by 25%	PTBD (Percutaneous transhepatic biliary drainage)	Done by trained interventional radiologist. Done under local anesthesia with post procedural routine analgesics
MCU (Micturating cystourethrography)	Topical anesthesia is used with sterile precautions	Nerve Block	Carried out by the team of Anesthetist and Radiologist. It is as per the guidelines of anesthetist
CT (Computed tomography)	Painless procedure except IV line. Pressure injector causes discomfort	Pleural effusion/Ascites tapping	Trained or clinician who is well versed with the procedure. Local anesthesia with puncture needle as per the requirement. Post procedural analgesia is required
DSA (Digital subtraction angiography)	Technique requires procedural local anesthesia. Anesthesiologist may be required for the administration of conscious sedation or general anesthesia.	US guided Laser Thrombectomy for varicose veins	All procedures are carried out by interventional radiologist with or without the help of anesthetist
Special investigation procedures (Barium and other contrast studies)	Topical or locally injectable anesthesia can be used as per the requirement	Endovascular procedures for balloon dilatation, stents, coiling etc.	All procedures have to be carried out with an anesthetist as most of the procedures require general anesthesia
Mammography	Painless procedure	Chemo embolisation	By interventional radiologist but monitoring by anesthetist is always helpful
US (Ultrasonography)	Painless procedure. Except contrast HSG where local anesthesia is required	Intra articular injections	Done under local anesthesia by the radiologist or clinician or surgeon
TVS (Transvaginal sonography)	Mild discomfort. Care should be taken IVP cases where no anesthesia/analgesia is to be given	FNAC (Fine needle aspiration cytology)	Routinely done under local anesthesia
PTC (Percutaneous transhepatic cholangiography)	Local anesthesia with post procedural routine analgesics	Surgical/Simple and guided approach	Routinely done under local anesthesia
CT Myelography	Lumbar puncture with local anesthesia (now replaced by MRI)	DSA Therapeutic	Interventional radiologist with the team of anesthetist resident

There are specific guidelines of all the institutes, and our institute guidelines are given in [Table 3].

There is a lot of difference between the sedation and sedation with hypnosis. Sedation with proper protocol in the cases requires more cost than simple sedation with hypnosis as required in many interventional radiological procedures.<sup>[6,7]</sup> The crucial factor is whether radiologists are competent enough to provide safe pain management and sedation alone. However, the best management of the patient can be achieved with the combined efforts of the two specialists which add to patient comfort with favorable outcome. The principle theme of pain management is working in a different environment other than the regular operation theatre and focusing on safety and comfort of the patient. This includes meeting the requirement of the procedure while keeping the patient immobile which tests the skill of the anesthesiologist. This is more challenging job when this has to be carried out by the trained personnel not related to the speciality of

anesthesia. The overall responsibility of anesthesiologist is regarding the smooth flow of pain management section and the related maneuvers done outside by other specialists like radiologists.<sup>[8,9,10]</sup> There is a need for appropriate and accurate planning for sedation and pain management which may vary from patient to patient and also depends on the procedure being done. This is the main domain of anesthesiologists who are well versed with the physiology, pharmacology and clinical management of the case. There is requirement of a lot of coordination for achieving the desired results and outcome. The standard approach in the process evolves through the following steps:

- A. Prevention
- B. Diagnosis
- C. Treatment.

The first category includes etiological factors and symptomatology of pain and its prevention. The whole process aims to alleviate or reduce the pain. Pain can affect various endocrine, cardiovascular, immune and neurologic related issues. Patient may present with a spectrum of symptomatology including headache, irritability, depression, cough, nausea, sleep problems, intestinal related problems and decrease in sexual desire.

Gallup survey in America had shown that,

- 89% people complained of pain at least once a month
- 15% had severe pain
- 27% had to take leave and miss work
- 60% accepted this as a regular feature and a part of life

This is an area where the anesthesiologist is most appropriate because he is most familiar with the pharmacokinetics and pharmacodynamics of the drugs that are routinely used in operation theaters. A large group of patients with chronic pain just require radiological evaluation where only mild sedation and reassurance may be needed. This group is evaluated radiologically with anesthetic protocol approach if required. Second group is constituted of patients in whom the conventional surgical procedures have been replaced by minimally invasive interventional radiological techniques. The patient may require not only radiation related procedure but also analgesia. This requires coordination between the anesthetist and radiologist during the peri-procedural period. The patient should be sedated and the procedure should be pain free. Third group is of patients constitutes that require deep sedation by the anesthetics as the procedure may be very painful. Also, the radiologist requires the patient to be still during the duration of the procedure. Spine, musculoskeletal and facial are the main territories which come under the protective umbrella of pain management which is dealt by both radiologists and anesthetists. The number of patients that fall into this category may be small, but it is here that there are maximum chances of harm may occur to the patient.

The patient may also have to undergo some CT scanning procedure where the anesthetist monitors the patient from a distance through the window of the console room .

Spinal procedures in relation to pain management are as follows:

- a) Nerve roots blocks
  - b) Epidurals
  - c) Spinal lumbar steroid injections
- Musculoskeletal procedures are guided by fluoroscopy, computerized tomography and ultrasound and are as follows:
- a) Intra articular injections of Shoulder, hip, knee and sacroiliac joints
  - b) Aspiration of fluid from the joints
  - c) Biopsy of visceral organs.
  - d) Vertebroplasty and kyphoplasties
  - e) Radiofrequency (RF) ablation procedures

All patients who require sedation while undergoing interventional procedures must be monitored for heart rate, oxygen saturation, continuous ECG and blood pressure throughout the procedure. All the necessary equipments for emergency should be available for any untoward eventuality. The patient should be discharged with appropriate instructions and after care. All the complications in regard to sedation should be dealt as per the standard protocol. In pediatric patients the safe and effective sedation and analgesia is required in various invasive and painful procedures. The effective combination of fentanyl and propofol had been quite effective as per one of the study without any complications.<sup>[11]</sup> In stroke patients there is decision making dilemma In endovascular thrombectomy procedures, whether sedation or general anesthesia is required.<sup>[12,13]</sup> There is extensive use of interventional procedures in MRI room where MRI-compatible anesthesia equipment and monitors are required for sedation and anesthesia. The drill has to be with proper safety protocol and to decide regarding the medication to be used.<sup>[14,15]</sup> All interventional procedures have to be carried out keeping in view about the duration and dose of the radiation for the clinician. This is more concerned about the non radiologist team including anesthetist as they are not much aware about the radiation hazards and the safety.<sup>[16,17]</sup> The working in emergency department (ED) is totally different from the planned sedation and pain management related to various procedures. Pre sedation and post sedation care is more important issues in these patients. This still becomes more important as this has to be dealt by non-anesthesiologist either working as part time or full time.<sup>[18]</sup> According to one Canadian study it was observed that their radiology residents do not have enough knowledge and training for the medication required for conscious sedation.<sup>[19]</sup> It is recommended that there should be more stress on training for the residents working in this environment. This becomes still more important as

unexpected handling of these patients may come during emergency cases.

## CONCLUSION

Anesthesiologists and Radiologist are core members of the team dealing with patients of chronic pain requiring interventional procedures. There is a strong need for close monitoring of the patients and a smooth working relationship between the radiologists and anesthesiologists for an improved outcome.

## REFERENCES

1. Warwick RJ, Platts AD, Watkinson AF. Sedation and anaesthesia in radiology. *Clin Radiol* 1997;52:246e9.
2. Amin A, Lane JS. The future of anesthesia for intervention radiology. *Curr Opin Anesthesiol* 2018;31:469
3. Patatasa K, Koukkoulli A. The use of sedation in the radiology department. *Clinical Radiology* 2009;64:655-663.
4. Mueller PR, Biswal S, Halpern EF, et al. Interventional radiologic procedures: patient anxiety, perception of pain, understanding of procedure, and satisfaction with medication—a prospective study. *Radiology* 2000;215(3):684-8.
5. Krauss B, Green SM. Sedation and analgesia for procedures in children. *N Engl J Med* 2000;342:938-45.
6. Lang EV, Rosen MP. Cost analysis of adjunct hypnosis with sedation during outpatient interventional radiologic procedures. *Radiology* 2002;222:375-82.
7. Vari A, Gangi A. Anesthesia Practices for Interventional Radiology in Europe. *Cardio Vascular and Interventional Radiology* 2017;40:803-813.10. Arepally A, Oechsle D, Kirkwood S, et al. Safety of conscious sedation in interventional radiology. *Cardiovasc Intervent Radiol* 1988;24:185e90.
8. Kerlan RK, Marone T, Ring EJ. The clinical role of the interventional radiologist. *Semin Intervent Radiol* 1988;5:103e4.
9. Watkinson AF, Torrie P, Platts AD. The role of anaesthesia in interventional radiology. *Br J Radiol* 2002;75:105e6.
10. Harshfield DL, Teplick SK, Brandon JC. Pain control during interventional biliary procedures: epidural anaesthesia vs i.v. sedation. *AJR Am J Roentgenol* 1993;161:1057e9.
11. Bauman LA, Kish I, Baumann RC, Politis GD. Pediatric sedation with analgesia. *Am J Emerg Med* 1999;17(1):1-3.
12. Schonenberger S, Uhlmann L, Hacke W, et al. Effect of Conscious Sedation vs General Anesthesia on Early Neurological Improvement Among Patients With Ischemic Stroke Undergoing Endovascular Thrombectomy: A Randomized Clinical Trial. *JAMA* 2016;316:1986.
13. Trotteur G, Stocky L, Dondelinger RF. Sedation, analgesia and anaesthesia for interventional radiological procedures in adults. Part I. Survey of interventional radiological in Belgium. *JBR-BTR* 2000;83:111e5.
14. Berkow LC. Anesthetic management and human factors in the intraoperative MRI environment. *Curr Opin Anesthesiol* 2016;29:563.
15. Bluemake DA, Breiter sn. Sedation procedures in MRI imaging, safety, effectiveness, and nursing effect on examinations. *Radiology* 2000;216:645-52.
16. Anastasian ZH, Strozzyk D, Meyers PM, et al. Radiation exposure of the anesthesiologist in the neurointerventional suite. *Aestheolog* 2011;114:512.
17. Dagal A. Radiation safety for anesthesiologists. *Curr Opin Anesthesiol* 2011;24:445.

18. Innes G, Murphy M, Nijssen-Jordan C, et al. Procedural sedation and analgesia in the emergency department. Canadian consensus guidelines. *J Emerg Med* 1999;17:145e56.
19. Mayson K, Lennox P, Anserimo M, et al. Canadian radiology residents' knowledge of sedation and analgesia: a web-based survey. *Can Assoc Radiol J* 2006;57:35e42.

**Copyright:** © Annals of International Medical and Dental Research. It is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

**How to cite this article:** Ramchandran P, Sharma S, Sharma S, Sharma S, Singh T, Varma M, Sharma BB. Role of Anaesthesia & Radiology in Relation to Pain Management – An Overview. *Ann. Int. Med. Den. Res.* 2020; 6(5):AN01-AN04.

**Source of Support:** Nil, **Conflict of Interest:** None declared