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The Contraindications and Criteria of Diagnostic Radiology - "*Is it Still a Concern in this Modern Age*?"

R. Adityan[1], R. Sujitha[2]

[1]Post Graduate Student of M.Sc., Radiography and Imaging technology, KMCH Institute of Allied Health Sciences – Affiliated to The Tamilnadu Dr. MGR Medical University, Coimbatore, Tamilnadu, India, +91 95970 05708.
adityanravichandran[at]gmail.com

[2]Post Graduate Student of M.Sc., Cardiovascular imaging and Endovascular Technologies, All India Institute of Medical Sciences, Delhi, India, +91 87603 23175.
Corresponding Author Email: *sujitha16nov[at]gmail.com*

Abstract: ***The diagnostic radiography and imaging technology has various modalities with its own crucial nature. It also has its potential disadvantages in the name of "Contraindications" too which states that under certain conditions the diagnostic radiographic technique is impossible to perform. For the diagnostic imaging during pregnancy, USG can be done with reduced exposure time, CT and MRI can be done by justifying the benefit risk ratio and scan time. Patients with previous allergic reaction history to contrast media can be examined by changing the contrast media or with the help of premedication. The updated ESUR guidelines recommend the use of iodinated contrast media in pregnant patients only under limited and exceptional conditions. The ACR concludes that gadolinium based MRI examination for pregnant patients should be considered only when diagnostic outcome is justified. For lactating women, breast feeding is not a mandatory to stop unless the patient is in high risk category.In recent days all the timely followed procedures were potentially replaced by various clinical studies, recommendations, guidelines, and advancements in technologies leading to the betterment of human wellbeing at any cause. The future of medical imaging relies on eliminating all these contraindications without the cost of patient health and image quality.***

Keywords: Contraindications, Radiology, Risk benefit ratio, pregnant patients

1. Introduction

The diagnostic radiography and imaging technology has various modalities that uses both ionizing and non-ionizing radiation with a crucial part in patient's treatment planning as it is considered as one of the primary method of ruling out any abnormalities in patients. Apart from the own crucial nature, it also has its own disadvantages in the name of *"Contraindications"* too which states that under certain conditions the diagnostic radiographic technique is impossible to perform.For every CECT, usually a pre investigation fasting period of 4 – 6 hours is suggested but as per the directives issued by ESUR and ACR recommends that fasting is not a mandatory preparation criteria for CECT examination. The European Society of Cardiology and American Heart Association's reports states that patients with olden cardiac pacemakers can also undergo MRI examination under strict guidelines.

Contraindications can be further classified into(1),

- ***Absolute Contraindication***– If an investigation is performed; it potentially causes a life-threatening event or the investigation's risk is higher than the outcome's benefit.
- ***Relative Contraindication*** - If an investigation is performed, its benefits are higher than the risks involved in it.

The major focus of this review is to evaluate the commonly considered contraindications and criteria for any diagnostic radiography investigation and possibility of potential solutions or alterations for those in this modern age.

The mostly encountered contraindications and criteria were grouped in this article as follows,

1) Pre patient preparation for contrast enhanced computed tomography (CECT) examination.
2) Implant imaging in MRI
3) Diagnostic imaging during pregnancy.
4) Usage of contrast media in critical populations.
5) Claustrophobic patients in MRI

At the end of this review, there may be a solid solution or practice alterations for this commonly addressed contraindications.

2. Current Practices and Trends

1) Pre Patient Preparation for CECT Examination

The patient preparation is one of the major factors that influence the diagnostic image quality as well as patient comfort during the procedure. The two most commonly followed patient preparation criteria was,

- Fasting before performing the procedure (NPO).
- Beta blockers before coronary computed tomography angiography (CCTA).

a) Fasting before performing the procedure (NPO)(2)**.**
The fasting was clinically introduced as a preoperative initiative during the anesthesia administration. The reason

was to avoid gastric content regurgitation leading to pulmonary aspiration which results to complications. From this initiative, the next 70 years of clinical history has the same criteria being followed for procedures like CECT that involves iodinated contrast media (ICM) injection which is one of the uttermost preferred radiological procedures worldwide. For every CECT, usually a pre investigation fasting period of 4 – 6 hours is suggested in most of the medical institutions. The goal for fasting as a choice is to promote emptying of gastric contents and to escape from emetic complications due to high-osmolar contrast media (HOCM) which is owned in olden days as the patient will be in supine position. But it is also notable that fasting does not only assure an empty stomach, it also reduces the pH of the gastric contents. Additionally, in the occurrence of any life-threatening event, unobstructed airways and empty stomach leads to ease tracheal intubation and airway manipulation. In case of routine investigations, fasting has adequate negative effects too. It creates hypoglycemia in patients with diabetes, dehydration, general discomfort, etc. In pediatric patients, fasting affect the body metabolism activity which leads to irritability, dehydration, non-cooperation during investigations, etc.

In this era, we use non-ionic low-osmolar contrast media (LOCM) as well as iso-osmolar contrast media for CECT examinations. The manufacturer of those declares that, these new contrast media need only suitable hydration and no other special preparations needed. Also the above mentioned complications were not highly noted in fully conscious patients. There are various directives issued by radiological associations like European Society of Urogential Radiology (ESUR) guidelines V10.0 in 2018, and American Committee of Radiology (ACR) 2021 recommends that fasting is not a mandatory preparation criteria for CECT examination.

But there is an exception on the event of gastric enhancement scan, in that examination fasting period of minimum 4 hours before the procedure is recommended with 1 liter of water intake for adequate gastro intestinal tract filling that paves way for good quality precise imaging.

b) Beta blockers before coronary computed tomography angiography (CCTA)(3)

Among the angiographic examinations, CCTA is crucial as it is the imaging of coronary vasculature in motion during the investigation. Patients undergoing CCTA are considered among the unique populations in radiological examinations. During CCTA, due to the limitation of the temporal resolution relative to coronary vasculature motion, medication induced heart rate depletion is performed. This medication is called as beta blockers. The usually used beta blockers for CCTA were metoprolol which has the tendency to control heart rate and collaterally heart rate variability too. In some cases, sublingual nitroglycerin is being used as a vasodilator.

METOPROLOL is regularly used beta blocker as it has a half-life of three to four hours and also it has dual role of lowering heart rate along with bronchial structures constriction. Apart from its advantages, there are situations where it must be used under relative or absolute contraindication. Metoprolol must be introduced cautiously for active asthma, obstructive pulmonary diseases patients. As CCTA is usually done to diagnose atherosclerotic diseases, many patients may have cerebrovascular involvement too. In patient with signs suggesting reduced cerebral blood flow (CBF), metoprolol must be discontinued.

Intolerable patients due to reduced heart rate for time period equivalent to half-life of metoprolol must be suggested with an alternative like esmolol which is a fast acting beta blocker. **ESMOLOL** is a cardiac specific, shorter half-life of 9 minutes beta blocker. The medication's effect starts diminishing once the injection has been ceased. The only disadvantage in this is, in case of altered flow rate during injection results in altered heart rates.

For absolute contraindication of metoprolol patients, **DIALTIAZEM** can be used which has very least inotropic effect.

2) Implant Imaging in MRI

The biocompatibility of the implant material is highly considered during implantation in human body(4). Previously implants made up of, stainless steel, cobalt-chromium alloy has been used as the implant material(4). But considering the radiological compatibility of patients, especially for their future MRI investigations(4).The MRI uses intense magnetic fields so that metallic implants have higher hazard of causing damage to the implants as well as radiofrequency wave induced heating causing damage to the tissues(5).In the mid 1990's, Titanium has been introduced as a MRI compatible material as it is paramagnetic in nature(5)(6)and it dominates the market till date as a raw material for orthopaedic as well as various other implants because of their bio safety aspects(5).In MRI, depending on the safety aspects of the implant it is classified as(7),

1) **MRI safe**– allowed to scan without any concern
2) **MRI unsafe**–absolute contraindication for scanning
3) **MRI conditional** – scan can be performed under certain circumstances as prescribed by the manufacturer.

Before performing a scan with MR compatible implant, it is necessary to check over the clear documentation of the implant by the manufacturer (7). Also, if an implant is considered as MRI conditional for scanning in certain machines, it may be an MRI unsafe in some other scanners also(7).The types of MR compatible implants used in clinical practices were(6),

a) **Mechanical heart valves** – They are not a contraindication for scanners from 3 tesla (T) or lesser. Some minor interaction may occur relies on the material used(6).
b) **Sternal wires** – usually made up of alloy or stainless steel which is not a contraindication for MRI(6).
c) **Embolisation coil and Vena cava filters** – In oldendays, coils and filters were made up of faint ferromagnetic stainless steel which has shown displacement of the filter and related complications in certain studies. But in recent days, it is an inclusive of platinum or any other alloy which is non ferromagnetic and MRI safe. In case of necessity for imaging in faint ferromagnetic filter patients, the scan must be performed only after 6 weeks of post implantation(6).

d) **Contraceptive devices (permanent)** – It is usually an inclusive of non-ferromagnetic material or it may also be an inclusive of weakly ferromagnetic materials like metal or copper. So, heating and displacement will be the major issue to be concerned about during the investigation. Various studies have proven that patients examined in 1.5T or lesser scanners have no effects (6).
e) **Cosmetics and tattoos** – It contains iron oxide particles in it which may cause heat, swelling, burns, and irritation during the examination. Usually this is a contraindication for MRI, but the scan can be performed with proper supervision and precautions(6).
f) **Implantable cardiac pacemaker and cardioverter defibrillator–**It is reported that patients with cardiac pacemakers and implantable cardioverter defibrillators (ICD) has 50 – 75% possibility of having MRI in post implantation period. This is one of the crucial contraindication to be considered whether patients with cardiac pacemakers and implantable cardioverter defibrillators were allowed for MRI investigation or not. This factor is highly considered now a days as the number of patients having cardiac pacemakers and clinical indication for MRI with pacemakers are increasing. Usually pacemakers are made up of variety of ferromagnetic materials along with electrical systems with at least one lead in myocardium(6). Under MRI environment the pacemaker may have the probability to respond by dislodgement, asynchronous pacing, and penetrating trauma(8)and lead current induction by the gradient magnetic field(9)that causes arrhythmias, and tachycardia, etc. which makes it more complicated for examination under MRI. In some cases sudden deaths has also been disclosed after MRI(10).The MRI can be performed in such patients if there is no other choice of modality available for treatment by justifying that the benefits are higher than the risks involved in it. In that case also it must be performed in an experienced centre under conscious supervision with expertise in cardiology and MRI. Now a days, MRI compatible pacemakers came to advent which has reduced the usage of ferromagnetic materials in the pacemaker. Such pacemakers are specially tested and approved for MRI investigation under in label usage(11).Compared with pacemaker, ICD patient needs close monitoring as the damage to myocardium is higher and it is irreversible. Hence the criteria's and patient benefit vs risk ratio must be strictly evaluated (11).

Even though all the contraindications have been adequately resolved, still certain criterias like patients with recently implanted cardiac devices especially within 6 weeks of implantation, fractured device leads, intracardiac/epicardiac pacer devices with external generator is still considered as contraindications(9).Recent reports from the European Society of Cardiology and American Heart Association have stated that conventional pacemakers and ICDs are safer to undergo MRI at a 1.5T field strength by using specific tailored protocols(9). Strict criteria and appropriate monitoring includes tracking of patient's heart rate, oxygen saturation, and blood pressure during examination(10). The acoustic and visual contact with the patient ensures enhanced monitoring recommendations throughout the examination(10). In case of any patient discomfort, the scan must be immediately aborted and the patient must be evacuated and monitored with well experienced and trained with advanced cardiac life support training (10).A study conducted for 1500 patients with cardiac pacemakers which were MRI non conditional (conventional) in a 1.5T MRI scanner (7). The pacemaker was reprogrammed for all the patients prior to investigation has shown no complications for all the patients (7).

The Food and Drug Administration (FDA) has given a statement summarizing that the MRI related risks with cardiac pacemaker patients were still not yet properly characterised to justify it as safe for routine examination. But the current studies and recommendations by MRI safety in patients with implantable cardiac devices states that patients with cardiac pacemakers and implantable cardioverter defibrillators was scanned safely without any complications in experienced centres. It is also notable that still the adverse effects has been unknown and it is safe to consider it as a relative contraindication to routine MRI (11).

g) **Neurostimulator and aneurysm clip –** It is also one of the MRI contraindication but it is now acceptable for examination as MRI compatible materials were used now a days for manufacturing. In case of aneurysm clip, all clips manufactured after 1995 were considered as MRI conditional(10).

In recent days **MAGNESIUM** is used for implant manufacturing due to its in-vivo degrading (self-healing) ability because of similar alignment with human cortical bone density(4). The structural strength were also closer to the stainless steel and titanium compounds(4). The major advantage of this implant in MRI environment is that reports have shown no heating of these implants during scan and it is also MRI compatible (4).

The dental implants should also be considered as it is also commonly done procedure for patients. The implants made of **ZIRCONIA** were used recently instead of titanium based implants as it is MRI compatible and gives lesser susceptibility related artifacts in contrast to titanium pre and post implantation(12). The main goal of developing zirconia was to avoid error in distance measurement which is one of the most important factor that need to be considered for dental implantation. The titanium gives higher susceptibility at the ends compared to the implants made of zirconia at the ends of the implant. Hence by using zirconia, accurate height, location, size, and shape assessment can be done which is a boon for implant dentistry(12).

Future Direction

The advanced MRI scanners now-a-days are clinically built to biological tissue imaging of patients but it lacks to deal with implants in the body(13). On that aspect everything is monitored and done manually except SAR detection. Hence the hope for future direction of implant imaging in MRI is that the scanner should have built in capability to detect implants in the part being examined and adjust the parameters for imaging (13).

3) Diagnostic Imaging During Pregnancy

USG

From the reports of certain animal studies it is stated that there is risks of tissue heating in the body while using Ultrasonography (USG) in early gestation period. Hence it is optimal to use USG when there is clinical necessity and also techniques like Doppler scans should be avoided during early pregnancy(14).The USG sensitivity to foetus is higher in first trimester(15).At the first trimester USG scanning, even though there is no contraindications related to it, safety precautions like ultrasound wave exposure time must be limited, indicators of mechanical and thermalvalues must be monitored and set as low as reasonably possible, Doppler USG must be avoided(10), and non-medical purpose USG scans must be discouraged(7).

CT

For the CT investigation of patients with known pregnancy, there is scattered radiation exposureto the foetus in case of head, chest, or extremities CT (16). In those cases, the radiation dose is estimated by the factor of patient alignment with the gantry (16). The off-centered patient of 30mm can accelerate the radiation dose from 12 to 18% whereas for 60mm it may lead to 41 to 49% increase in radiation dose(10). Whereas for these CT examinations, the radiation dose is lesser as the foetus is interacted with scattered radiation. The CT pulmonary angiography can also be performed with justification of risk benefit ratio as the radiation dose to the foetus is low(10). The chest CT scan of pregnant mother in the first and early second trimester can be performed as there is lesser scatter to the uterine region. Also CT can be conducted in second and third trimester patients in case of unavailability of MRI. Contrast enhanced studies can also be performed in case of no known history of iodine related allergies(15). The American association of obstetricians and gynaecologists states that a single diagnostic procedure with a radiation dose lesser than 50 mGy does not give effects like foetal abnormalities and loss of pregnancy (10).

MRI

During the MRI of the foetus, there is a concern of developing acoustic damage caused by the sound generated in the rapidly switching gradient magnetic fields (17) of the MRI scanner during acquisition especially during echoplanar imaging technique. The rapid switching gradients creates 80 to 120 dB of acoustic noise (17). To rule out the real cause of the concern, a study was conducted in a healthy volunteer with microphone ingested through the oesophagus with fluid filled stomach which simulates gravid uterus (18). The dangerous sound intensity level was 120dB, and 90 dB is the upper threshold limit as further increase in noise starts causing acoustic noise (17). But, during the examination, less than 90dB was transmitted to the microphone which clearly reassured the experimental evidence stating that there is no remarkable risk of damage to the foetus's acoustics during prenatal MRI (18).There are clinical studies conducted in the pregnant patients to rule out the acoustic effects of the foetus in MRI (17). A clinical trial states that amniotic fluid attenuates most of the sound waves delivering less than 30 dB to the foetus (15). A retrospective study of around 1737 patients who underwent MRI in first trimester demonstrated that after delivery of the children there is no notable abnormalities like neoplasm, vision loss, congenital anomaly, and hearing loss were noted (17). Another study was conducted in 2015 for 72 patients who underwent MRI in their third trimester shown that for their children there is no noteworthy abnormalities like hearing loss, altered motor skills were observed (17).

In MRI, the heat deposition in the tissues were quantified by the term called as specific absorption rate (SAR).It is the radio frequency power absorbed per unit mass of tissue (19). The FDA has prescribed a maximum acceptable whole body SAR value of 4W/kg as the limit which causes increase in body temperature of 0.6C during a 30 minutes MRI examination (17). Higher SAR values investigation has caused potential risks in animals like malformations etc. Hence, this heating factor is acceptable when the imaging technique is performed under acceptable SAR values (17). There are two types of modes in MRI scanner namely, normal mode with SAR limit of 2W/kg and first level mode with SAR limit of 4W/kg (9).

In 2007, the ACR has given guidelines for MRI scan for pregnant patients stating that in case of potential benefits is higher than the risks of the examination, then the scan can be performed(15).The ACR states that MRI examination is safe during pregnancy despite of the trimesters(10).

4) Usage of Contrast Media in Critical Populations

The instillation of contrast media (CM) in diagnostic radiography is to elevate the image quality which eventually increases the radiologist's diagnostic ability in differentiating structures. Regarding the bio safety aspect of the CM, it must have higher concentration in tissues without any induction of adverse effects. But all the CM have their own inherent effects in tissues (20).

USG (10)

Whenever a non - ionizing radiation involved diagnostic investigation is superior to ionizing radiation procedures with equivalent image quality, it must be uplifted to do so. The most uncommon and under rated procedure is contrast enhanced USG examination. They have various characteristics like

- They possess very minimal risk and effects with patients.
- They are not excreted via renal system, hence it can be safely administered for patients with nephrogenic systemic fibrosis (NSF) and nephropathies.
- They do not have iodine and there is no need of any previous functional and blood related assessments for administration.
- They give useful diagnostic information for hepatic and non-hepatic related pathologies.
- It is superior to unenhanced CT for abdominal abnormalities (8)

The common effects observed were headache, discomfort, chest pain, and nausea.

CT (10)

Patients with previous history of allergic reactions

The previous allergic reaction history to contrast media is considered as an absolute contraindication. Changing the contrast media for consecutive investigations in such

patients resulted in lowered incidence of allergies(7) . They have 5 times higher probability of generating risk in their second dosage. Additionally, after the advent of non – ionic contrast media these effects were drastically reduced. Also CECT procedures can be made with premedication drugs like antihistamine and corticosteroids along with the risk benefit ratio justification. But in some cases complications occurs even premedication were given(20) .The allergies to MRI gadolinium (Gd) based contrast media were not considered as contraindication for CT contrast media.

Patients with contrast induced nephropathy

The highly reported risks to CT contrast media was allergies and CIN. In case of life threatening events related to contrast media injection, it occurs within the initial 20 minutes of instillation. CECT can be performed in end stage renal disease anuric patients with no transplanted kidneys. Haemodialysis can be made for patients with higher risk of developing CIN. Patients with peritoneal dialysis and creatinine level of 4.4 to 7 tends to have no contrast induced complications with the volume of lesser than 100ml of contrast media (21).The CIN usually affects patients with glomerular filtration rate (GFR) under the value of 30. The patients with GFR of 30 to 45 are rarely nephrotoxic. Patients with risk of developing CIN can be administered with isotonic solutions such as physiological saline, and sodium bicarbonate solution prior and post procedure(21).The patients with known history of hyperthyroidism are mostly contraindicated for the procedure, but in case they have been given contrast media, they must be followed by strict monitoring under experienced endocrinologists and some can be benefitted by prophylactic thyrostatic therapy. Patients with repeated CECT within 1 to 2 days of first CECT tends to develop CIN(21).

Patients under metformin medication

Among the special population for CECT examinations, **METFORMIN** medication patients are also crucial. They have the threat of developing lactic acidosis that more easily leads to acute kidney injury. For performing diagnostic imaging of ordinary renal function patients, metformin should be suspended at the examination time and for at least 48 hours. The renal function tests must be taken and ensured before re instillation of metformin (20). Whereas for patients with improper renal function, the administration must be terminated during examination and cautious renal function follow ups must be ensured before re administration of metformin (20).

Pregnant patients

The updated ESUR guidelines prescribes recommendations for the iodinated contrast media instillation in pregnant patients. It states that the instillation must be limited and only under exceptional conditions. The thyroid functioning tests must also be obtained for the neonate in the first week (20). Also some recent recommendations states that the use of iodinated contrast media in pregnant patients is not contraindicated (18). However the real fact is, in case of amniofetography with ionic contrast media (instillation of CM directly to the amniotic fluid) has the likely effect and not on intravenous usage (18). But as a general criteria all the pregnant patients who had iodinated contrast media during pregnancy, on their post-delivery, their neonates will be screened for thyroid function test as iodine has the capability of producing hyperthyroidism (18). The reason behind this is the physiological process of infant's thyroid when exposed to excessive iodine reacts with an auto regulatory process called as wolff-chaikoff process which reduces thyroid hormone production leading to secondary hypothyroidism. This mechanism is not in its full fledge until 36 weeks of gestation(22).It is reported that in neonates, higher non-ionic contrast media doses tends not to disturb thyroid functioning (23).

MRI (10)

The gadolinium at its original form is toxic to human beings. To reduce the toxicity it is chelated to components to make it clinically useful. In olden days studies have proven that chelated gadolinium has the tendency to cross through the placenta and may enter the fetal circulation (17). Also previous studies have stated that infants exposed to Gd exposure in their first trimester have shown side effects like inflammatory, infiltrative, and rheumatological conditions. But second and third trimester exposed infants have shown no increased effects (17).

The pregnant healthcare professionals like technologists, doctors, etc. can work in the MRI environment in all stages of their pregnancy. They can perform all kind of activities except remaining in the MRI scanner room while scanning is done (17). The FDA states that Gd based contrast must be used for imaging only if there is mandatory cause for performing the scan (24). The ACR has also recommended that before any MRI examination, child bearing age women must be previously screened for pregnancy (24).

Patients with contrast induced nephropathy

The Gd instilled patients with renal insufficiency commonly have the likelihood of developing NSF which is an occasional life threatening disease. It was initially reported in 2001 which is the fibrotic changes of skin and other organs abnormally in patients with renal insufficiency(25). However patients with renal insufficiency were one of the commonly preferred one for Gd enhanced MRI despite of CECT due to their minimal risks(25).For the MRI of patients with end stage renal insufficiencies, Gd with macrocyclic agents or low dosage of high relaxivity linear agents were prescribed as they are safer compared to iodinated contrast media(25).The population also needs to be considered for contraindication were patients with previous history of allergic reaction to Gd contrast media which is very rare compared to iodine contrast media.

A clinical study of blood was drawn from the patients with renal impairment who underwent Gd enhanced MRI scan were processed with plasma atomic emission spectroscopy and high performance liquid chromatography for continuous 5 days after the examination. The results shows that there is no gadolinium noted from the tests(23).

Pregnant patients

The ACR concludes that Gd based MRI examination for pregnant patients should be considered only when diagnostic outcome is justified.

Lactating women

The ESUR and Italian Ministry of health have recommended guidelines for lactating women. It states that breast feeding can be continued even after both iodinated and Gd based CM examination but in case of high risk agents used, breast feeding should be terminated for 1 day after contrast media injection. However cautious decision making is the only key to avoid any potential risks. Also New England journal of medicine also states that after iodinated CM instillation, involves no risk of breast feeding to infants(18).

The Gd based contrast media has a prime base material called as Gadopentetate(26). It excretes through breast milk in very smaller amount of 0.04% of total dose administered. Among them, only 0.8% is absorbed by the infant. However in case of Iodinated contrast media it is absolutely altered (26). It does not excretes through breast milk. Additionally the European society of radiology has also issued guideline regarding use of Gd in patients with pregnancy. Their report also states that the use of gadolinium is safer in pregnant patients in considerable volumes(27).

Gadolinium retention in brain

The studies have proven that Gd based contrast media retain on brain tissues for a period of time. The FDA in 2017 has released a report stating that Gd retention in brain tissues does not cause any adverse effects. But, due to their unknown potential long term effects, appropriate knowledge in their administration is necessary especially while examining pediatric population. However major steps must be taken as much as possible to avoid Gd based examinations like using diffusion weighted imaging.

Patients under metformin medication

For Gd enhanced MRI of metformin patients, the drug is no longer needed to be discontinued unless only usual dosage of Gd is used for examination(20).

5) Claustrophobic Patients in MRI

One of the major concerns faced by all the patients during an MRI investigation is Claustrophobia (6). It occurs to approximately up to15% of all the patients. In this condition imaging cannot be further performed and the scan must either be withdrawn or sedation can be done(6). The claustrophobia depends on the type of MRI scanner used, patient position in the scanner, age, and gender. Now-a-days larger width bore opening MRI, conical shaped shorter length bores with reduced acoustic sound has been manufactured to avoid these effects. Similarly open MRI systems can also be considered as a choice (19).The patient body habitus was one of the limitations for performing a CT and MRI examination in olden days as the weight limit was a maximum of 160 kg. Now-a-days, patients with weight of maximum 200kgs are capable of performing scans (7).

3. Conclusion

The major motto of this article is to rule out the core causes of all time followed criteria and contraindications related to radiological examinations. In recent days all the timely followed procedures were potentially replaced by various clinical studies, recommendations, guidelines, and advancements in technologies leading to the betterment of human wellbeing at any cause. But the replacements was adequate for some and majority were done based on post procedural risk management and justification of benefit – risk ratio assessment like contrast media instillation in renal insufficiency patients and pregnant patients, implant imaging in MRI, etc. This relies on the knowledge and experience of the imaging professional and also the consultant physicians. The future of medical imaging relies on eliminating all these contraindications without the cost of patient health and image quality.

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