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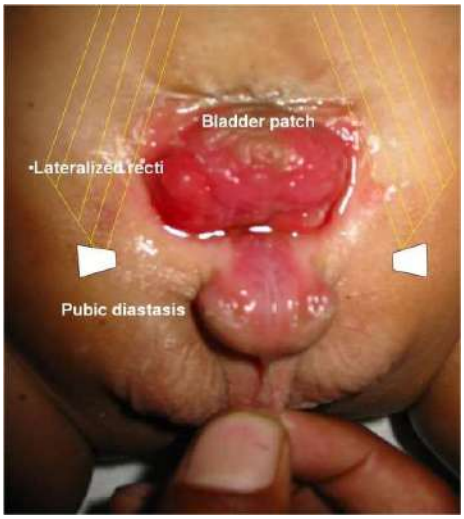
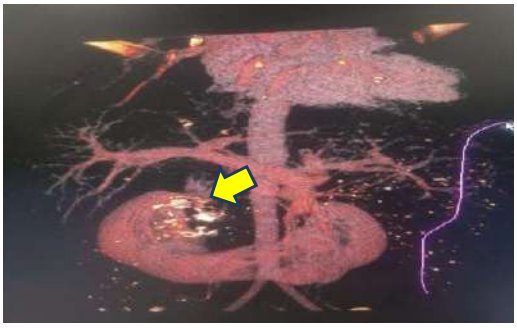
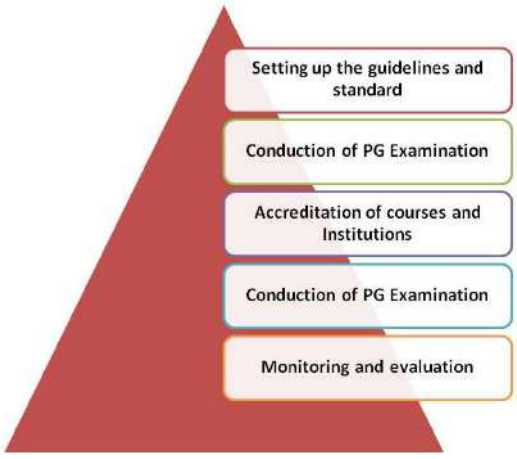


Bladder Exstrophy - Epispadias Complex: Poor quality detrusor; lack of bladder neck sphincter; Short stubby penis

Complete primary repair of bladder exstrophy-epispadias complex in a neonate.



Reconstructed CT image of the horseshoe kidney with the origin of the cyst from the interpolar region of the right segment (arrow showing the cyst)



Possible roles of the NBE in running PG courses in Artificial Intelligence in medical sciences

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EDITORIAL

Impact of Artificial Intelligence in Indian Health Sector — Training and Economy

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It is indeed significant news that India is taking over the chair of the Global Partnership on Artificial Intelligence (GPAI). This international initiative aims to promote the responsible and human-centric development and use of Artificial Intelligence (AI), which is a rapidly growing field with enormous potential to transform various sectors and industries.

AI has been catalyzing the tech landscape worldwide and pushing the envelope of human possibilities. Its application ranges from healthcare to finance to transportation, and it has the potential to improve efficiency, accuracy, and productivity across various sectors.

For India, AI is a kinetic enabler for the growth of the technology ecosystem, and it can be a force multiplier in achieving its goal of becoming a $1 Trillion Digital Economy by 2025. With India's diverse talent pool and a growing number of startups, the country has the potential to become a leading hub for AI development and innovation [1].

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As the chair of GPAI, India will have a significant role in shaping the international discourse on AI governance and ethics. It will be crucial to ensure that AI is developed and used responsibly, with the protection of human rights and dignity at its core. Additionally, India can use its position to drive collaborations and partnerships among member countries to promote the development of AI solutions that address global challenges.

Overall, India's leadership in GPAI can be a significant step towards harnessing the full potential of AI for the betterment of humanity while ensuring its responsible and ethical use.

Artificial Intelligence (AI) has the potential to transform the Indian health economy by improving access to healthcare, reducing costs, and increasing the efficiency of healthcare delivery. India is home to a large population, and the healthcare sector faces significant challenges in providing quality care to all citizens. AI can help address some of these challenges by providing innovative solutions and enhancing the capabilities of healthcare providers.

One of the significant applications of AI in healthcare is predictive analytics, which can help in early detection and prevention of diseases. AI-powered algorithms can analyze patient data and identify patterns that can help doctors diagnose diseases at an early stage, reducing the chances of complications and improving patient outcomes. AI can also help in the development of personalized medicine, where treatments are tailored to the specific needs of individual patients.

AI can also be used to improve the efficiency of healthcare delivery in India. For instance, telemedicine, which involves providing remote medical consultations, can help patients in remote areas access healthcare services. AI-powered chatbots and virtual assistants can also be used to provide patients with basic medical advice, reducing the burden on healthcare providers.

Moreover, AI can help in the management of healthcare resources and the reduction of healthcare costs. For example, AI-powered predictive maintenance can help hospitals maintain medical equipment, reducing the chances of breakdowns and downtime. AI-powered supply chain management can also help in the efficient management of medical supplies, reducing wastage and ensuring that healthcare providers have the necessary resources to provide quality care (Fig. 1).

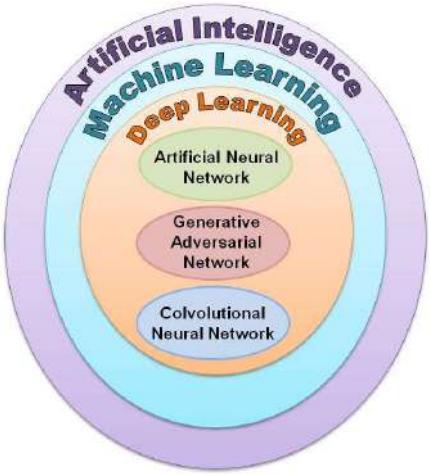

Fig. 1. AI & ML — Structure

AI is expected to add USD $967 Bn to Indian economy by 2035 and USD 450–500 billion to India's GDP by 2025, accounting for 10% of the country's USD 5 trillion GDP target.

It works in collaboration with partners and international organisations, leading experts from industry, civil society, governments, and academia to collaborate to promote responsible evolution of AI and guide the responsible development and use of AI, grounded in human rights, inclusion, diversity, innovation, and economic growth.

Artificial Intelligence (AI) and Machine Learning (ML) are rapidly emerging fields in India, with significant potential to transform various sectors, including healthcare, finance, education, and agriculture [2].

- **In healthcare,** AI and ML can be used for disease diagnosis, medical image analysis, drug discovery, and personalized medicine. Several Indian companies and startups are developing AI-powered healthcare solutions, such as remote patient monitoring, telemedicine, and health chatbots.
- **In finance,** AI and ML can be used for fraud detection, risk assessment, and investment analysis. Several Indian banks and financial institutions are using AI and ML-powered tools for credit scoring, fraud detection, and customer service.
- **In education,** AI and ML can be used for personalized learning, student assessment, and educational research. Several Indian edtech companies are developing AI-powered learning solutions that adapt to individual students' needs and preferences.
- **In agriculture,** AI and ML can be used for crop monitoring, yield prediction, and pest management. Several Indian startups and organizations are developing AI-powered tools for precision

agriculture, such as crop monitoring using drones and satellite imaging.

The Indian government is also taking initiatives to promote the adoption and development of AI and ML in the country. The government has launched the National AI Portal to promote research, innovation, and development in AI and ML. Additionally, the government has also established the Centre of Excellence in AI and Robotics, which aims to promote research and development in AI and Robotics.

AI and ML have significant potential to transform various sectors in India, and there is a growing interest and investment in these fields in the country.

AI and ML in Medical Science

AI and ML are rapidly emerging fields in medical science in India, with significant potential to transform various aspects of healthcare delivery, including diagnosis, treatment, drug discovery, and patient care.

- One of the key applications of AI and ML in medical science in India is medical imaging analysis. AI and ML-powered tools can help radiologists and other healthcare professionals to analyze medical images, such as X-rays, CT scans, and MRIs, with greater accuracy and speed. Several Indian startups and companies are developing AI-powered medical imaging solutions that can assist in the diagnosis of diseases such as cancer, tuberculosis, and cardiovascular diseases.
- Another area where AI and ML are being increasingly used in medical science in India is drug discovery. AI and ML-powered tools can help in the identification of potential drug candidates, prediction of drug efficacy, and optimization of drug development processes. Several Indian companies and startups are developing AI-powered drug discovery platforms that can accelerate the drug discovery process and reduce costs.
- AI and ML are also being used in patient care in India. AI-powered chatbots and virtual assistants can help patients to access healthcare services, such as appointment scheduling, medication reminders, and health monitoring. Several Indian startups are developing AI-powered healthcare platforms that connect patients with healthcare providers and provide personalized care.
- In addition, AI and ML are being used in medical research in India. AI-powered tools can help researchers to analyze large datasets, such as genomics data and clinical trial data, with greater efficiency and accuracy. This can lead to the development of new treatments and therapies for various diseases.

AI and ML in Pharmacy

AI and ML are emerging fields in pharmacy in India, with significant potential to transform various aspects of the

pharmaceutical industry, including drug discovery, development, and manufacturing.

- One of the key applications of AI and ML in pharmacy in India is drug discovery. AI and ML-powered tools can help in the identification of potential drug candidates, prediction of drug efficacy, and optimization of drug development processes. This can help in the development of new drugs and therapies for various diseases. Several Indian companies and startups are developing AI-powered drug discovery platforms that can accelerate the drug discovery process and reduce costs.
- Another area where AI and ML are being increasingly used in pharmacy in India is drug development. AI and ML-powered tools can help in the design of clinical trials, prediction of drug safety, and optimization of drug dosage. This can help in the development of safer and more effective drugs. Several Indian companies are using AI and ML to optimize drug formulations and dosage regimens.
- AI and ML are also being used in drug manufacturing in India. AI-powered tools can help in process optimization, quality control, and supply chain management. This can help in the production of high-quality and cost-effective drugs. Several Indian pharmaceutical companies are using AI and ML to improve the efficiency and effectiveness of their manufacturing processes.
- In addition, AI and ML are being used in pharmacovigilance in India. AI-powered tools can help in the detection and reporting of adverse drug reactions, drug interactions, and medication errors. This can help in the prevention of drug-related harm to patients. Several Indian companies and startups are developing AI-powered pharmacovigilance platforms that can improve drug safety and patient outcomes.

AI and ML — Economy booster

AI and ML have significant potential to boost the economy in India in several ways, including increasing productivity, driving innovation, and creating new jobs.

- One of the key ways in which AI and ML can boost productivity in India is through process automation. AI-powered tools can help automate repetitive and time-consuming tasks, such as data entry and processing, customer service, and inventory management. This can help businesses to streamline their operations, reduce costs, and improve efficiency.
- Another way in which AI and ML can boost the economy in India is by driving innovation. AI-powered tools can help businesses to develop new products and services, improve existing ones, and enter new markets. This can help businesses to

stay competitive and grow their market share.

- AI and ML can also create new jobs in India. As businesses adopt AI and ML technologies, there will be a growing demand for skilled professionals, such as data scientists, machine learning engineers, and AI researchers. This can create new employment opportunities for Indians and help to reduce unemployment in the country.
- In addition, AI and ML can have a significant impact on various sectors of the Indian economy, such as healthcare, education, agriculture, and transportation. AI-powered solutions can help in the delivery of high-quality and personalized healthcare services, improve access to education, increase agricultural productivity, and enhance transportation safety and efficiency.

AI — Virtual assistance to healthcare professionals

Artificial intelligence gives healthcare professionals ease when it comes to monitoring, understanding and analyzing the needs and lifestyle patterns. The application of AI in recent years has effectively improved Cancer screening, Tuberculosis diagnosis, Diabetic retinopathy screening, Chronic Obstructive Pulmonary Disease diagnosis and management. The use of Machine Learning-based deep-learning algorithms can provide valuable insights to healthcare providers in deciding the course of action and strategies for patients. It can also aid in the early detection and prevention of diseases by capturing the vitals of patients. NLP-based virtual personal assistants can help in appointment scheduling, monitoring, understanding the needs of patients [2] (Fig. 2).

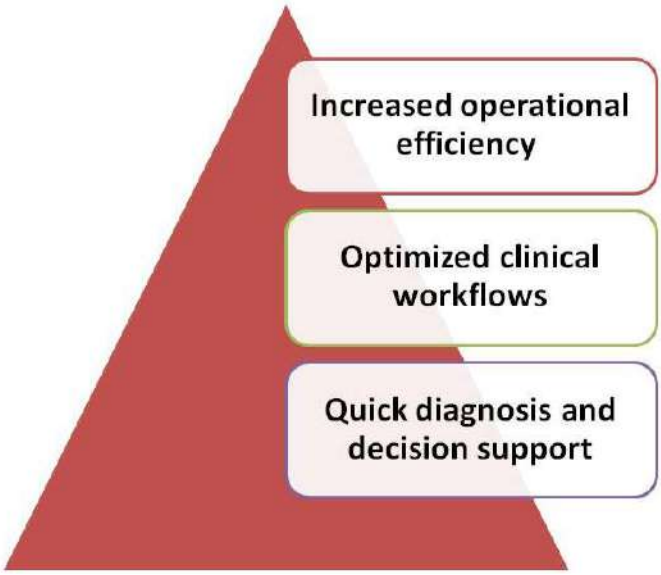

Fig. 2. AI – Virtual Assistance to Health Care Professionals

India has the potential to become a global leader in health science AI if it can develop a comprehensive strategy to leverage its strengths in health care, technology, and AI. Here are some key steps that could help India achieve this goal (Fig. 3):

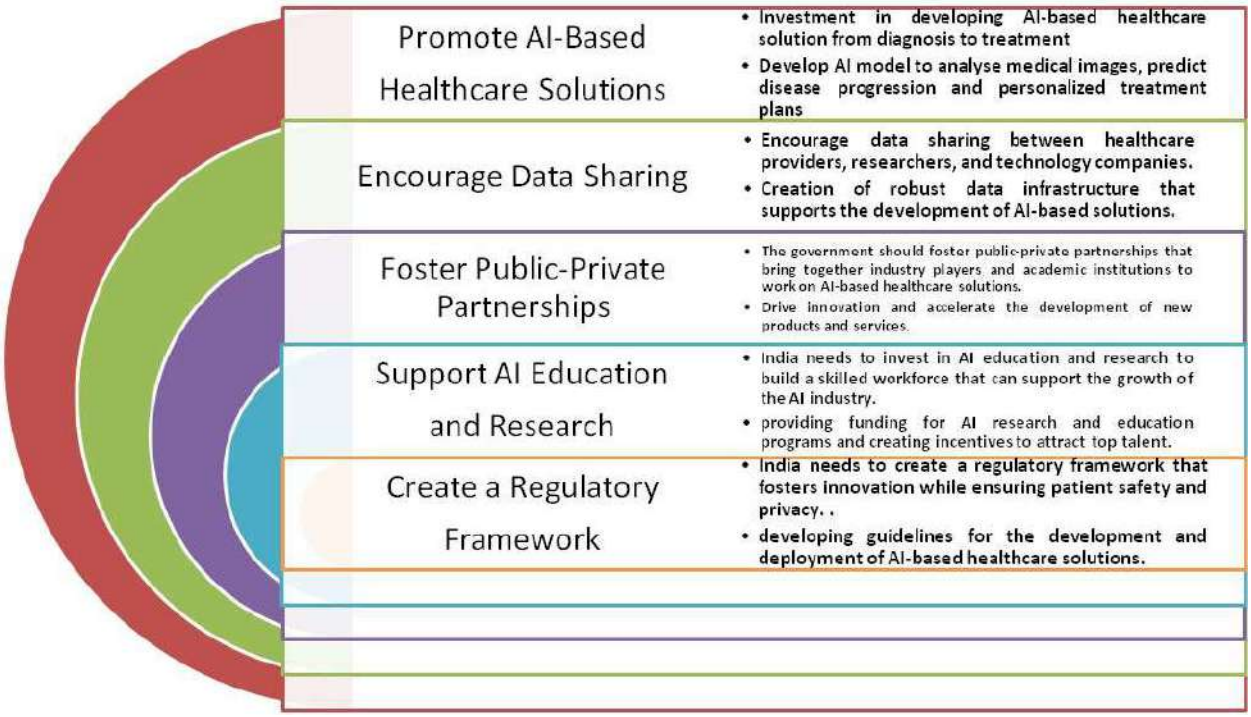

Fig. 3. Steps can be taken to promote AI in Medical Sciences

By following the step mentioned in Fig. 3, India can create a thriving AI ecosystem that supports the development of innovative healthcare solutions and establishes it as a global leader in health science AI (Figs. 4 and 5).

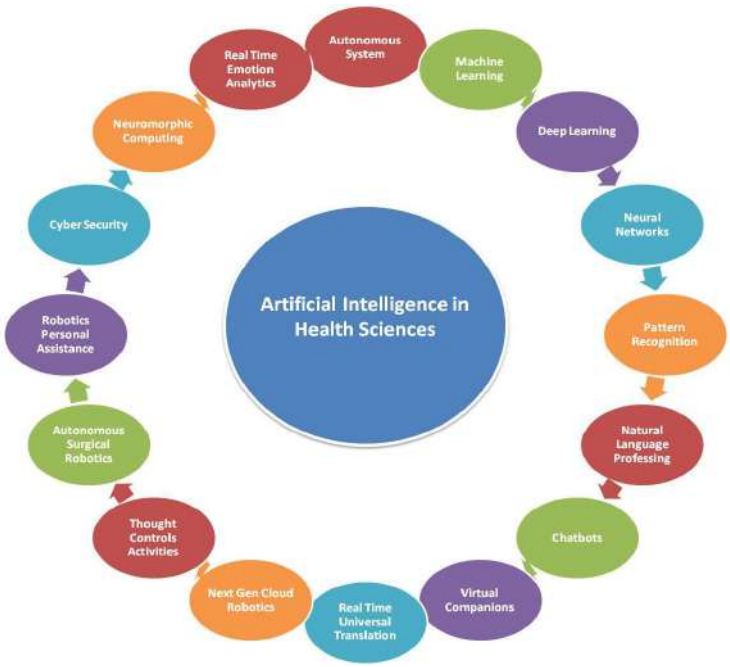

Fig. 4. Spectrum of AI in Medical Sciences

Fig. 5. Applications of AI in Medical Sciences

Role of National Board of Examination in Health Sciences (NBEMS) in promoting AI in post-graduate training

- The formation of NBEMS was established by the Government of India to standardize postgraduate medical education and examination in the country.
- In recent years, with the growing importance of artificial intelligence

(AI) in the field of medicine, there has been a significant increase in the demand for postgraduate courses in AI in medical sciences.

- In this context, the role of the NBE can be significant in running postgraduate courses in AI in medical sciences (Fig. 6).

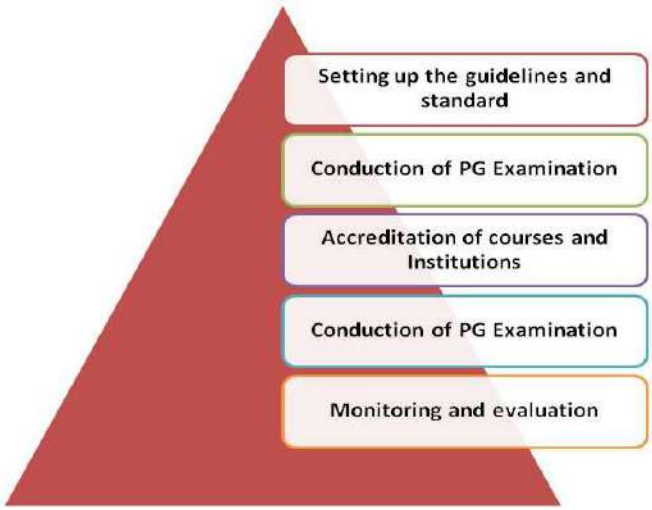

Fig. 6. Some possible roles of the NBE in running postgraduate courses in AI in medical sciences.

Some possible roles of the NBE in running postgraduate courses in AI in medical sciences could include:

- Setting up guidelines and standards: The NBE could set up guidelines and standards for the curriculum, teaching, and assessment methods for postgraduate courses in AI in medical sciences. This could help ensure that the courses are of high quality and meet the requirements of the medical profession.
- Conducting entrance examinations: The NBE could conduct entrance examinations for admission to postgraduate courses in AI in medical sciences. This could help ensure that only qualified candidates with a certain level of knowledge and skills are admitted to the courses.
- The NBE could play a crucial role in standardizing and regulating postgraduate courses in AI in medical sciences, which could help ensure that these courses are of high quality and produce qualified professionals who can contribute to the field of medicine.

Significant steps taken by the Govt. of India and Ministry of Health and Family Welfare (MOHFW) to promote AI in Medical Sciences

The Government of India and MOHFW have taken several significant steps to promote the use of Artificial Intelligence (AI) in medical sciences.

Here are some of the key initiatives:

1. **National Digital Health Mission (NDHM):** Launched in August 2020, NDHM is a comprehensive initiative aimed at creating a digital health ecosystem in India. One of its key components is the development of a National Health Stack, which includes a data exchange platform that can be leveraged to build AI-based applications and services.
2. **National AI Portal:** The National AI Portal, launched in 2020, is an online platform that aims to promote collaboration and innovation in AI development. It includes a dedicated section on healthcare, which provides resources and information on AI-based healthcare solutions.
3. **AIIMS-Wadhwani Institute for Artificial Intelligence:** The All India Institute of Medical Sciences (AIIMS) has partnered with the Wadhwani Institute for Artificial Intelligence to establish a research center dedicated to AI in healthcare. The center will focus on developing AI-based solutions for cancer screening, drug discovery, and other healthcare applications.
4. **Atal Innovation Mission:** The Atal Innovation Mission is a flagship initiative of the Government of India aimed at promoting innovation and entrepreneurship in the country. Under this program, several incubation centers have been established that focus on AI-based solutions for healthcare.
5. **National Cancer Tissue Biobank:** The National Cancer Tissue Biobank is an initiative launched by the Department of Biotechnology to collect and store tissue samples from cancer patients. The initiative aims to create a repository of samples that can be used for research purposes, including the development of AI-based solutions for cancer diagnosis and treatment.
6. **National Digital Health Blueprint (NDHB):** The NDHB, launched in 2019, outlines a comprehensive framework for the implementation of digital health initiatives in India. The blueprint includes provisions for the development and deployment of AI-based healthcare solutions.
7. **National Health Stack:** As part of the NDHM, the National Health Stack aims to create a digital infrastructure for healthcare data exchange. The stack includes provisions for the development of AI-based healthcare solutions, including predictive analytics and personalized medicine.
8. **Ayushman Bharat:** Ayushman Bharat is a national health protection scheme launched by the government in 2018. Under this scheme, the government aims to provide health insurance to over 100 million families in India. The scheme includes provisions for the development and deployment of AI-based healthcare solutions, such as telemedicine and predictive analytics.
9. **National Biomedical Resource Indigenization Consortium (NBRIC):** The NBRIC is an initiative launched by the Department of Biotechnology to promote the development of indigenous biomedical

resources in India. The consortium includes provisions for the development of AI-based healthcare solutions, such as drug discovery and personalized medicine.

10. **National Cancer Grid:** The National Cancer Grid is a network of cancer centers and research institutions in India. The network includes provisions for the development of AI-based solutions for cancer diagnosis and treatment.

Some possible steps that can be taken by Govt. of India and MOHFW to promote AI in Medical Sciences

- The development of AI and ML applications in medical sciences in India would benefit from government incentivization.
- There is still a need for more government incentives to promote the development of AI and ML applications in medical sciences in India. For example, the government could provide tax incentives or funding for companies and startups that are developing AI and ML-powered solutions for healthcare. This could encourage more investment in these technologies and help to accelerate their development and adoption.
- The government could also provide training and education programs to help healthcare professionals and researchers to develop the skills needed to work with AI and ML technologies. This could help to address the skills gap that currently exists in India and ensure that healthcare professionals are able to use these technologies effectively and safely.

Conclusion

India has the potential to become a global leader in health science AI if it can develop a comprehensive strategy to leverage its strengths in health care, technology, and AI. AI and ML have significant potential to transform various sectors in India, and there is a growing interest and investment in these fields in the country. India's leadership in GPAI can be a significant step towards harnessing the full potential of AI for the betterment of humanity while ensuring its responsible and ethical use. The initiatives taken by the MOHFW demonstrate its commitment to promoting the use of AI in healthcare. By supporting research and development in this area, the ministry aims to improve healthcare outcomes, reduce costs, and enhance the overall quality of care in India.

Conflicts of interest

The authors declares that they do not have conflict of interest.

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REVIEW ARTICLE

Bladder Exstrophy Epispadias Complex: Meeting the Challenge!

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Born with normal upper urinary tracts, children with BEEC have continued to test the ingenuity of Paediatric Surgeons.

The upper tracts are almost always normal in the neonates with classic BE before abdominal wall, posterior urethral, and bladder closure. However, the upper tract changes or deterioration of renal function almost always occurs after reconstructive surgery. (Fig. 1)

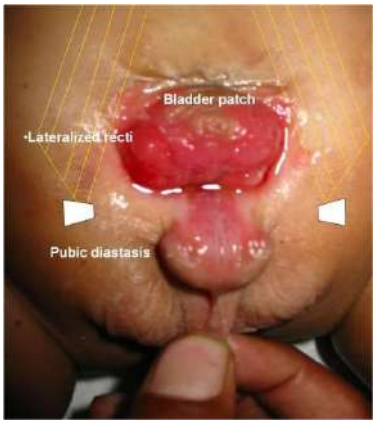

Fig. 1. Bladder Exstrophy - Epispadias Complex: Poor quality detrusor; lack of bladder neck sphincter; Short stubby penis

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The objectives of treatment are to achieve a secure closure of the bladder, pelvis, and the abdominal wall; preservation of renal function; urinary continence and creation of functional and cosmetically appealing genitalia.

Since the first description by Young *et* al. the goal of repair of BEEC is to create a safe reservoir for upper tracts, while providing socially acceptable voluntary voiding, has alluded the surgeons niversally [1].

Overtime various procedures have been described in different permutations & combinations. These are:

i) Jeffs & Cendron in 1970- staged repair: bladder closure followed by BNR & Epispadias repair, then
ii) Modern Staged Repair of Exstrophy (MSRE) wherein, Epispadias repair precedes BNR &
iii) Complete primary repair (CPRE) which include bladder closure, partial BNR

Epispadias repair in one stage.CPRE was performed on the premise that closure of bladder, bladder neck & the urethra together will stimulateearly bladder cycling & induce voluntary control onmicturation [2] (Fig. 2).

Fig. 2. Complete primary repair of bladder exstrophy-epispadias complex in a neonate

With CPRE: Up to, 70% of renal units develop (HN); pyelonephritis is seen in up to 28% of patients, 20-24% develop cortical renal scarring, and 10% nephrolithiasis [3-6].

Detrusor under activity has also been reported by this technique [7]. Overall, long-term renal outcomes aresimilar to those of other techniques presented in the literature. Ureteric reimplantation (UR) needed adequate bladder capacity. Different perceptions exist for capacity. Therefore, ureteric reimplantation simultaneous to bladder closure has been considered an over-do. (Ellison.).[6] As a result a more conservative approach has been adopted to VUR & a very small number subjected to reimplantation.

Growth of the bladder is fundamental to achieve these goals. Impetus to growth has been expected by increasing outlet resistance by BNR – Jeff & Gearhart; MSRE; CPRE & recently by Bladder Neck Injection [8-9].

While BNR was expected to provide impetus for bladder growth, it was soon realized, that, increasing outlet resistance leads to upper-urinary-tract damage and impairment of bladder function.[10]

BNR has also been recognized to impair bladder development but generates high intravesical pressures which were detrimental to the upper tracts [11].

Different aspects of outcomes from each of these approaches have been studied at varied intervals with wide ranging results. Renal damage rates has been reported to be 13% to 20% [12,13].

In another series 14.7% had renal scarring & 4.5 % had renal insufficiency [14].

Continence depends upon technically creating an adequate balance between

- Urine storage (which implies high outlet resistance and low storage pressure) and
- Complete bladder emptying (which implies low outlet resistance and a transient increase in bladder pressure);

- Surgery cannot achieve 'continence' (which implies active mechanisms) .Continence rates of only 10% to 30% were reported with this approach [15-16] (Fig. 3).

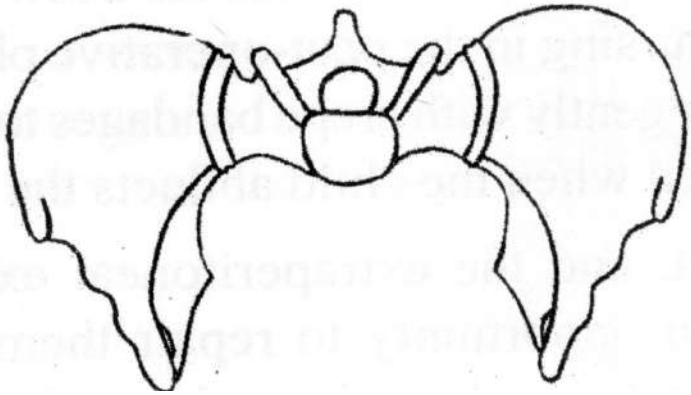

Fig. 3. Pubic diastasis in bladder exstrophy-epispadias complex (diagramatic).

Assessment of continence is often difficult, as data given by families are not always accurate and because the criteria used by various authors vary, even within the same institution. The fact that surgery cannot produce "continence" (which implies active mechanisms) emphasises the difficulty in finding an adequate balance between urine storage (which implies high outlet resistance and low storage pressure) and full bladder emptying (which implies low outlet resistance and a temporary increase in bladder pressure).

Augmentation helps but all segments of native bladder malignancy.

The concept of gastric neo-bladder: In BEEC the bladder is represented by a small patch of urinary bladder with its exposed mucosa

herniating from the lower abdomen. attempts to preserve the native bladder aimed at providing a receptacle for urine which would provide normal urinary control, store urine under pressures which are safe for upper tracts. Another alternative is to divert urine to the bowel.

After a ureterosigmoidostomy, bladder and bowel adenocarcinoma: Smulders and Woodhouse's outstanding series of 103 neoplasms demonstrated that this patient population has a 700-fold higher probability of developing cancer than the age-matched general population.
Lack of growth of the bladder in exstrophy has been attributed to intrinsic abnormalities. Following reconstructive surgery, some of these abnormal morphometric patterns return to normal, while others do not.

This arises the fundamental question of whether the exstrophic bladder cannot heal after reconstructive surgery or whether the operation was ineffective. Did the surgical reconstruction aid in bladder repair or did it worsen an already damaged bladder?

If the underlying morphometric and neurological abnormalities cannot be completely rectified by surgery, these issues are far from moot. Our reconstructive efforts leave behind irreversible renal injury & a childhood with morbidity of urinary incontinence with a bladder forever risk for malignancy.

These concerns cannot currently be answered, but they need to be solved in order to guide future reconstructive attempts to treat bladder exstrophy. Till then, we are offering these children with a Gastric neo-bladder after initial CPRE. Native bladder is replaced on attaining 5 years of age. The procedure involves harvesting the gastric bladder laparoscopically and lowering it to the pelvis. The remaining repair involves ureteric reimplantation and creating the Mitrofanoff channel.

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ORIGINAL ARTICLE

Evaluation of Red Cell Distribution Width and its Correlation with Left Ventricular Ejection Fraction in Heart Failure Patients

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Abstract:

Introduction: Red cell distribution width (RDW) is a coefficient of variation of the distribution of individual RBC volume, as determined by automated blood cell counting instrument. Numerous studies, conducted elsewhere, have demonstrated increased RDW to bea significant prognostic marker in patients with heart failure, both with reduced ejection fraction (HFrEF) and preserved ejection fraction (HFpEF). So, we designed this cross-sectionalstudy, to study the relationship between RDW and left ventricular ejection fraction (LVEF), the most significant echocardiographic parameter of left ventricular systolic function, in patients of heart failure in our region, at a tertiary care centre of North India.

Methods: This study was a cross sectional study conducted on 52 patients of heart failure,who attended medical emergency/outpatient services of Guru Nanak Dev Hospital, Amritsar. RDW was assessed with automated analyzer and LVEF was seen by echocardiography in heart failure patients and their association was studied by Pearson Correlation method.

Results: LVEF and RDW-CV revealed a Pearson Correlation coefficient of -0.861 which was statistically highly significant ($p < 0.001$), which stayed highly significant even after adjusting for other potential confounding factors like diabetes mellitus (DM), dyslipidemia andhypertension (HTN)

Conclusion: Heart failure patients with low LVEF have elevated RDW levels compared with normal LVEF, thus RDW correlated with severity of left ventricular systolic dysfunction.

Keywords: Heart failure, RDW, LVEF

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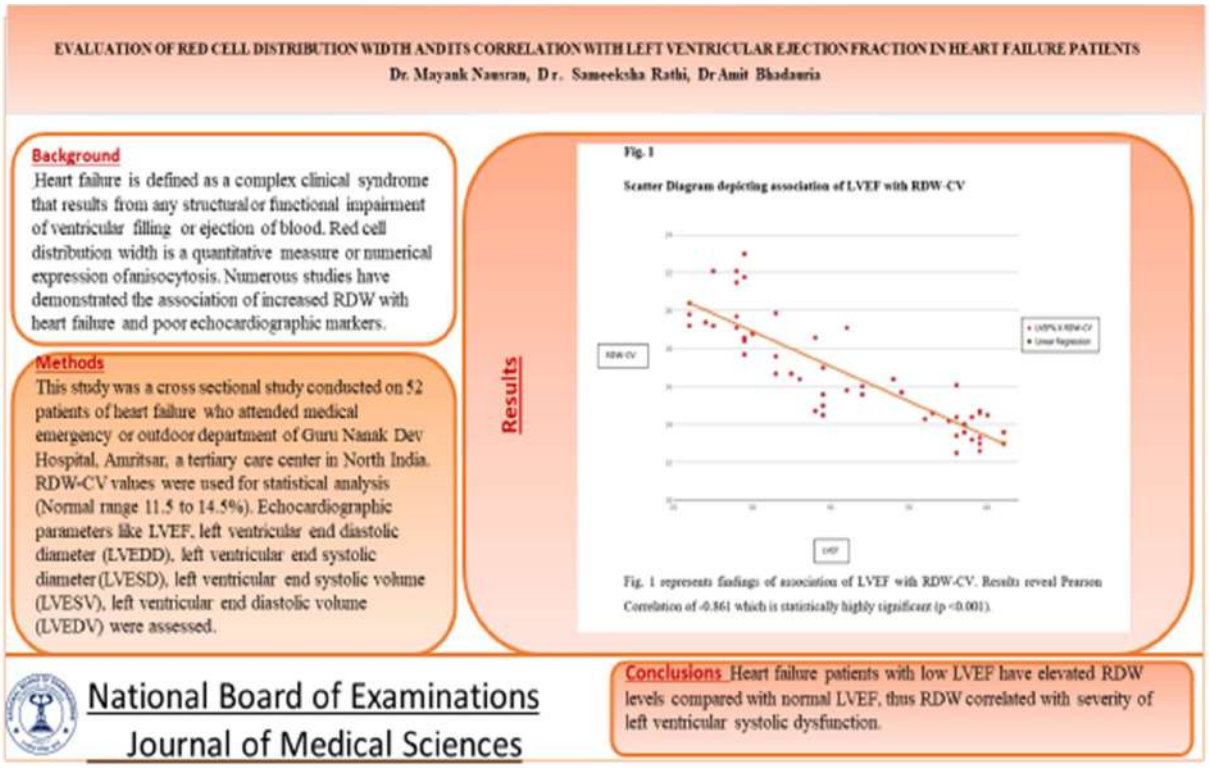
Graphical Abstract



Introduction

Heart failure is defined as a complex clinical syndrome that results from any structural or functional impairment of ventricular filling or ejection of blood [1]. It can also be defined as a pathophysiological state in which an abnormality in cardiac function (structural or functional) results in the failure of the heart to pump blood under normal cardiac pressures at a rate that isneeded to meet the metabolic demands of the body and if does so, it does it at high cardiac filling pressures [2].

Red cell distribution width is a quantitative measure or numerical expression ofanisocytosis. It is a coefficient of variation of the distribution of individual RBC volume, as determined by automated blood cell counting instrument. High red cell distribution width valuemirrors a large range in red cell size. It can be measured as either RDW-CV (Red cell distribution width–coefficient of variation) or RDW-SD (Red cell distribution width–standard deviation). RDW-CV is calculated from formula (standard deviation of RBC volume/mean corpuscular volume)*100. It varies normally from 11.5 –14.5%. RDW-SD is regarded as widthof the distribution

curve calculated arithmetically which is measured at the 20% frequency level. It is direct measure of calculating RDW.

RDW can be increased in a variety of conditions e.g. inflammation, ageing, oxidative stress, nutritional deficiencies, renal insufficiency. Numerous studies have demonstrated the association of increased RDW with heart failure and poor echocardiographic markers. It has been shown to be a poor prognostic marker, associated independently with increased rates of cardiovascular and all-cause mortality, hospitalization for acute decompensation or worsened left ventricular function, length of hospital stay, in patients with acute and chronic heart failure (HF). It is also a significant and independent predictor of developing heart failure in patients who currently do not have any signs or symptoms of heart failure.

This study was designed to assess the relationship between RDW and LVEF, the most significant echocardiographic parameter of left ventricular systolic function, in patients with HFpEF and HFrEF in our region, presenting at a tertiary care centre of North India.

Methods

This study was a cross sectional study conducted on 52 patients of heart failure (already diagnosed and newly diagnosed), who attended medical emergency or outdoor department of Guru Nanak Dev Hospital, Amritsar, a tertiary care centre in North India. The study was conducted after approval from institutional ethics committee, and informed consent was taken from patients to be enrolled in study. Our study conforms to widely accepted ethical principles guiding human research (such as the Declaration of Helsinki). The patients either newly diagnosed or already diagnosed cases of heart failure (HFrEF and HFpEF), who were 18 yearsand above, were included in the study. Patients who refused to give consent, had liver disease,renal disease, or anemia with Hb of <12 g/dl, and those with history of blood transfusion within past 3 months or haematological malignancy, were excluded from the study. All eligible patients were subjected to a detailed history taking and clinical examination, including assessment of signs and symptoms of heart failure, the NYHA classification of heart failure, risk factors such as smoking (smoking index >100), alcoholism (>14 units/week), hypertension, diabetes, dyslipidemia, coronary artery disease, and current and pastmedications. Biochemical investigations including HbA1c, fasting and post-prandial plasma glucose, oral glucose tolerance test (if required), liver function tests, fasting lipid profile, renal function tests were performed on all patients. Complete hemogram was performed in an automated cell counter Erba Mannheim H360. Hemoglobin, MCV, Hematocrit, RDW-CV and RDW-SD, amongst other parameters, were determined. Only RDW-CV values were used for statistical analysis. Normal range of RDW-CV was taken to be 11.5 to 14.5%. M-mode echocardiography was performed on these patients and echocardiographic parameters like LVEF, left ventricular end diastolic diameter (LVEDD), left ventricular end systolic diameter(LVESD), left ventricular end systolic volume (LVESV), left ventricular end diastolic volume(LVEDV) were assessed.

Statistical analysis was done with SPSS software ver. 26.0 and Epi Info 7.2.5.0. Difference of means in RDW-CV in different NYHA classes was tested with ANOVA. Correlation between RDW-CV and LVEF was assessed with Pearson Correlation Coefficient. Linear regression analysis was done to evaluate the potential

confounding effect of other variable that could have affected RDW-CV.

Results

Table 1 shows the baseline characteristics of the patients enrolled for the study. Mean age of the patients included in the study was 51.5 ± 15.47 years. Most of the patients were male (71.2%, n=37). Ischemic heart disease was the most common etiology of heart failure (59.6%, n=31). A majority of the patients were in NYHA class 3 (65.4%, n=34). Mean LVEF in these patients was 42 ± 12.9%. In the hematological markers, mean haemoglobin was 13.5 ± 4.04 g/dl, the mean MCV was 89.6 ± 5.23 fL, and the mean RDW-CV value was 16.7 ± 2.78%.

The RDW-CV values showed a statistically significant increase from NYHA class 2 to 4 (p value <0.001) (Table 2). On subgroup analysis, there was significant increase in RDW-CV from NYHA class 2 to 3, 3 to 4 and 2 to 4 (results not shown).

There was a highly significant statistical negative correlation between RDW-CV and LVEF (r = -0.861, p value <0.001) (Fig. 1).

On analysis of correlations of various other variables that could potentially affect RDW-CV, we found that presence of diabetes mellitus and dyslipidemia significantly increased RDW-CV (p values <0.001 and 0.002 respectively) and presence of hypertension also increased RDW- CV but marginally failed to achieve the level of statistical significance (p value 0.055). There was no statistically significant correlation between RDW-CV and age, gender, smoking, alcohol consumption and patient's Hb levels. So we performed a multiple linear regression analysis with RDW-CV as outcome variable and LVEF, DM, dyslipidemia and HTN as independent variables (Table 3). On conducting multiple linear regression analysis, we found that LVEF was strongly negatively correlated with RDW-CV, even after adjusting for other variables that affected RDW-CV in single linear regression analyses. In fact, the effect of DM, dyslipidemia and HTN became non-significant in this model, with a much greater than 10% change from individual correlation coefficients, suggesting that the effect of these variables onRDW-CV is due to LVEF itself.

Table 1. Baseline Characteristics

Characteristic	Value
Age (Mean ± SD)	51.5 ± 15.47
Sex (% (n)) Males Females	71.2 (37) 28.8 (15)
Risk Factors for heart failure (% (n)) Diabetes Mellitus HypertensionDyslipidemiaSmoking Significant Alcohol intakePrior CAD Prior hospitalization for heart failure	36.5 (19) 40.4 (21) 32.7 (17) 17.3 (9) 42.3 (22) 19.2 (10) 21.1 (11)
Underlying Etiology of heart failure (% (n)) Ischemic heart disease Rheumatic heart diseaseCalcific AS/AR Alcoholic Cardiomyopathy DCM – unknown cause Peripartum Cardiomyopathy Right Ventricular Dysfunction CHD with Eisenmenger's Complex	59.6 (31) 9.5 (5) 3.9 (2) 3.9 (2) 5.8 (3) 1.9 (1) 3.9 (2) 1.9 (1)
Myocarditis Cor pulmonale	1.9 (1) 7.7 (4)
NYHA Class (% (n)) Class 1 Class 2 Class 3 Class 4	0 15.4 (8) 65.4 (34) 19.2 (10)
LVEF (Mean ± SD)	42 ± 12.9
RDW-CV (%) (Mean ± SD)	16.7 ± 2.78
Hemoglobin (g/dl) (Mean ± SD)	13.5 ± 4.04
MCV (fL) (Mean ± SD)	89.6 ± 5.23

Table 1 shows the baseline characteristics of the patients enrolled for the study. Abbreviations:SD – Standard Deviation, CAD – Coronary Artery Disease, AS – Aortic Stenosis, AR – AorticRegurgitation, DCM – Dilated Cardiomyopathy, CHD – Congenital Heart Disease, NYHA – New York Heart Association, LVEF – Left Ventricular Ejection Fraction, RDW-CV – Red Cell Distribution Width - Coefficient of Variation, MCV – Mean Corpuscular Volume

Table 2. Comparison of RDW-CV according to NYHA Functional Class

NYHA Functional Class	RDW-CV (Mean ± S.D.)	p-value
1	-	<0.001
2	13.30±0.66	
3	16.40±2.02	
4	20.40±1.67	

Table 2 tabulates the findings of comparison of RDW-CV values according to NYHA Functional Class, obtained from Analysis of Variance (ANOVA) test. Results show statistically highly significant difference between RDW-CV values in all NYHA Functional Class ($p<0.001$).

Table 3. Multiple linear regression analysis for potential confounding factors

Variable	Coefficient	P-value
DM	0.665	0.144
Dyslipidemia	0.481	0.328
HTN	0.305	0.491
LVEF (%)	-0.166	<0.001

Table 3 shows the results of multiple linear regression analysis for potential confounding factors in addition to LVEF, that individually showed correlation with RDW-CV in single linear regression analyses (namely DM, dyslipidemia and hypertension). The results show thatthe negative correlation between LVEF and RDW-CV remains to be highly significant even after adjusting for these variables and the effects of the other variables became non-significantwhich suggests that their individual correlations can be explained by LVEF alone.

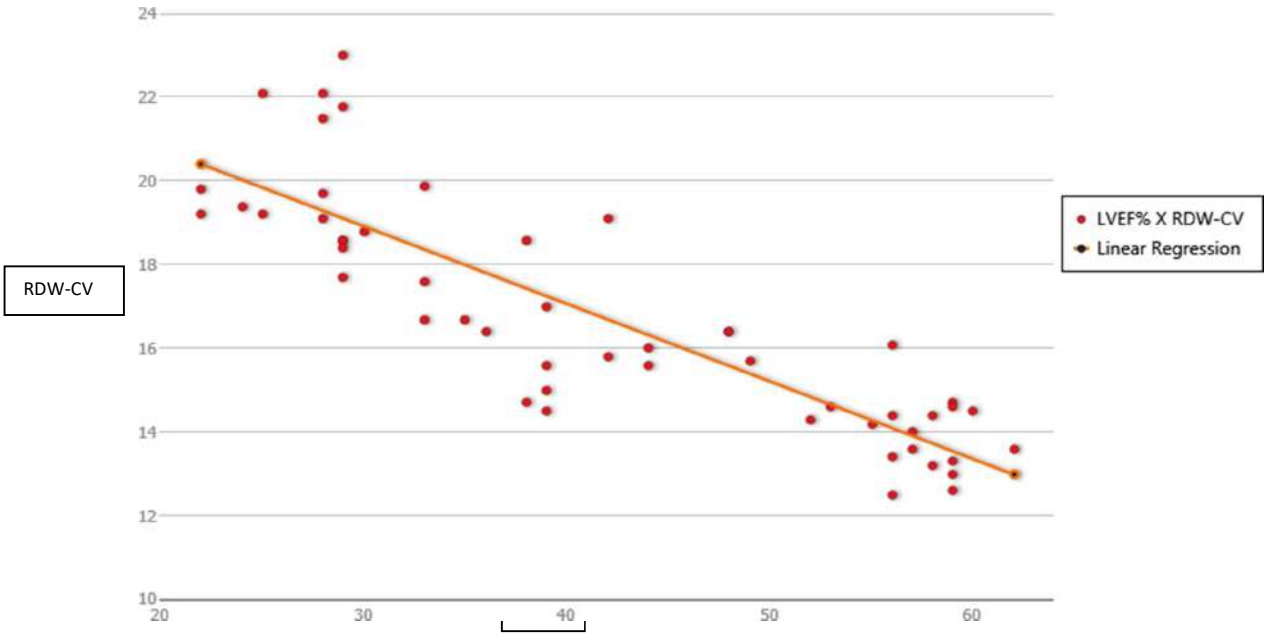


Figure 1. Scatter Diagram depicting association of LVEF with RDW-CV

Figure 1 represents findings of association of LVEF with RDW-CV. Results reveal Pearson Correlation of -0.861 which is statistically highly significant ($p < 0.001$).

Discussion

In our study patients more than 18 years of age were taken. Youngest patient enrolled in study was 20 years of age and the eldest one is 78 years of age. Majority of participants belonged to the age group of 40-49 and 60 to 69 years which added up to 23.1% each followedby 19.2% individuals of age group between 50-59 years. This age group is most prone to risk factors of heart failure like HTN/ DM/ Myocardial Ischaemia. Therefore this can be a reason why most of the patients admitted were of this age group. These values were further validatedin a study by Van Craenenbrock EM[3] where most of the patients were of age 50-70 years and study by Bozorgi et al. [4] where most patients were of age between 50-75 years.

In our study of all the individuals involved of various age groups, male participants added up to 71.2% which was more than double of female counterparts which were 28.8%. This may be due to males being more prone to cardiovascular diseases than females. Also intake of alcohol and smoking is more common in males than females. Above values are positively correlated with that in study by Bozorgi A et al[4] where 74.3% were males and Kawasoe et al. [5] 69% were men.

In our study most of the patients which presented in hospital for treatment were of NYHA class 3 which involved 65.4% patients. It was followed by NYHA class 4 which constituted 19.4%. In study by OH et al. [6] NYHA 3 plus 4 combined constitutes 83%. This could be because of the fact that it is a tertiary care centre and most of the patients present in late stages of the disease.

These patients had mean RDW-CV value of 16.7 which is well above the higher normallimit. Mean left ventricular ejection fraction in these patients was 42% which

depicts that even patients of preserved ejection fraction were in significant proportion. In study by Ferreira et al. [7] mean RDW-CV values were 15.4 $\pm$ 2.7 and ejection fraction values between 43.8 $\pm$ 11.1.

Results of this study reveal a statistically highly significant negative correlation between left ventricular ejection fraction and RDW-CV. This correlation becomes stronger as the patients progress from NYHA 2 to NYHA 4 classes of heart failure. This negative correlation stayed highly significant even after adjustment of other potential confounding factors like DM, dyslipidemia and HTN and the effect of these conditions, as seen in individual analyses disappeared after adjustment for LVEF. This suggests that LVEF affects RDW-CV, independent of other potential confounding factors. RDW is a useful prognostic marker not only for heart failure but also for atherosclerotic diseases, such as coronary artery disease or carotid artery disease [4]. In study by Bozorgi et al. [5] pearson correlation analysis demonstrated a significant ($p<0.001$) but weak negative correlation ($r=-0.268$) between RDW and LVEF. Instudy by Senthong V et al[8] high RDW values were significantly associated ($p = 0.04$) with LVEF < 40% in heart failure patients. In study by Ferreira et al. [7] RDW is associated with LVEF having p value less than 0.05 which is highly significant.

The study is not without limitations. The first limitation is the small sample size. The results of this study need to be established in larger studies. Secondly, this is a cross-sectionalstudy. Clear association of increased RDW with poor prognosis in patients with heart failure can be established by long term prospective survival studies. Thirdly, since 83% of the patients enrolled in the study had a NYHA class 3 or 4 heart failure, the results of this study may be more relevant to the patients with severe heart failure and not relevant much to the patients with lesser severity of heart failure. Nevertheless, despite all these limitations, our study has shown a highly significant negative association between RDW and LVEF, which is inconcurrence with the data from earlier studies.

Conclusion

RDW levels are increased amongst patients with heart failure patients. Heart failure patients with low left ventricular ejection fraction have elevated RDW levels compared with normal left ventricular ejection fraction, independent of presence of other potential confounding factors. RDW correlates with severity of left ventricular systolic dysfunction. Thus it can be used as a simple parameter that can help in assessing the severity of the heart failure. This becomes especially relevant in resource-poor settings where access to echocardiography may not be immediately available.

Conflicts of interest

The authors declares that they do not have conflict of interest.

Funding

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ORIGINAL ARTICLE

A prospective observational study of impact of body mass index on early postoperative complications following abdominal surgeries

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Abstract

Aims & Objectives: To determine the effect of higher BMI on early postoperative complications following abdominal surgeries and to assess whether the higher BMI has **positive / neutral / negative effect** on early (30 days)post-operative complications following abdominal surgeries.

Materials and methods: A prospective, single-centre, observational study conducted on 86 patients who underwent abdominal surgeries both open and laparoscopic, in emergency or elective procedure over a period of 1 year. Patients were categorised into 2 groups (body mass index (BMI) >25 kg/m2-overweight and patients with BMI < 25 kg/m2 - normal weight). Patients were followed till 30 days post-surgery.

Results: Most common post-surgery complication is observed to be seroma formation, which was more common in higher BMI patients.(12.19%).Other complications common in higher BMI were wound infection (4.44% in normal weight and 4.8 % in higher BMI),intestinal obstruction (2.22% in normal weight and 4.8% in higher BMI).Pulmonary complications(4.44%), re-exploration(4.44%),readmission, fever(2.22%), mortality and AKI (2.22%) were found to be more common in normal weight individuals.

Conclusion: There was no significant difference found in early post-operative complications following abdominal surgeries of patients in normal weight and higher BMI category. Higher BMI had effect only on the wound related complications.

Keywords: Body mass index (BMI -kg/m2), early (30 days) post-operative complications, abdominal surgeries, obesity.

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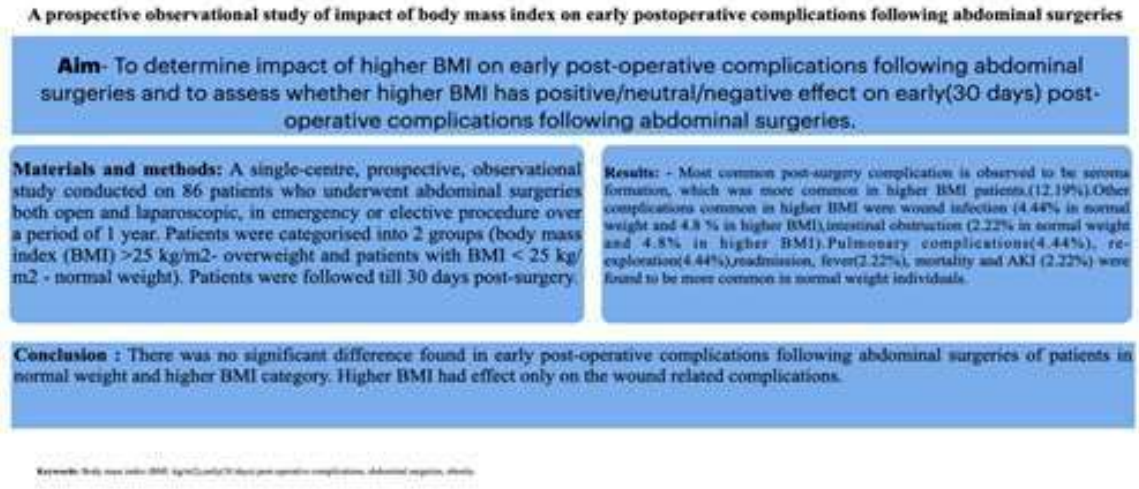
Graphical Abstract



Introduction

We are dealing with weight problems epidemic. An international estimate of 39% of adults are obese, and 13% are overweight in 2016. There's an extensive variation in occurrence rates of obesity and central obesity in India in line with ICMR-INDIAB study in 2015, and these rates vary from 11.8% to 31.3% and 16.9%–36.3%, respectively [1].

A higher BMI is considered one of the leading reasons for morbidity and mortality within the US [2]. A study expected that morbidity and complications related to higher BMI value $11 billion each year [3]. As our population has come to be more overweight, this value has expanded. Specialists foresee that by 2030 about half of the overall population is going to be obese, with 11% qualifying as morbidly obese [4].

Obesity is defined as an abnormal accumulation of fat such that fitness is impaired (WHO). Commonly, it's far assessed using the body mass index (BMI). Common techniques to determine the amount of adiposity include body mass index (BMI), waist circumference, skin folds, bioelectrical impedance evaluation, dual-strength x-ray absorptiometry (DEXA), computed tomography (CT), and magnetic resonance imaging (MRI) [5]. Historically, obese or obese status has been evaluated through an anthropometric weight-for-height measurement. It's recognized that weight problems are associated with various diseases like diabetes, cardiovascular sicknesses, and cancers like colon most cancers [6]. There are various factors that affect the result of surgery and its postoperative complications like related comorbidities, immunocompromised popularity, and infections. Higher BMI patients have an elevated occurrence of a respiratory disorder, type-2 diabetes, and oesophageal reflux. In addition, they have a difficult airway, more postoperative complications, and tough local anaesthesia [7,8]. For this reason, medical professionals and anaesthesiologists want to understand the perioperative implications of those serious problems in higher BMI sufferers. Weight problems end in excessive expenses due to postoperative complications related to excess weight. These complications call for similar interventions and longer medical institution stays. Higher rates of wound infection and surgical site infections (SSIS), hospital stays,

and readmissions may be attributed to obesity [9-13].

By understanding the postoperative complications which are related to obesity we are able to recommend and search for options to enhance their recovery and decrease complications they may experience. Moreover, within the era of recent healthcare reform, knowledge of which complications are more likely within the overweight or morbidly obese patient is of interest, giving us plans to switch rates for services on the concept of health centre-acquired complications [14].

With the upward push in minimally invasive surgical procedures and advances in medical and surgical control, perioperative complications and loss of life are rarer. But, whilst complications occur, they will delay adjuvant therapy (if any are required), create enormous tension, and generate extra expenses. This study is ambitious to analyse the affiliation of body mass index (BMI) with 30-day morbidity and mortality following abdominal surgeries.

Material and methodology

A single-centre, prospective, observational study conducted on 86 patients who underwent abdominal surgeries both open and laparoscopic and in emergency or elective procedure over a period of 1 year.

Inclusion criteria:

1) Patients of age >18 years
2) Patients undergoing emergency and elective abdominal surgery(both open or laparoscopic) within the study period
3) Patients giving consent for surgery.

Exclusion criteria

1) Patients primarily for gynaecological or urology operations or polytrauma patients
2) Patients undergoing open inguinal hernia surgery.
3) Patients who are undergoing day care surgeries under local anaesthesia
4) Patients in whom height or weight is not available and/or cannot be measured due to the disease condition of the patient.
5) Patients with immunocompromised status such as HIV, primary or secondary immunodeficiency disorders, patients who are on steroids(oral or systemic)for more than 7 days or immunosuppressant drugs, post organ transplant patient who are receiving immunosuppressant drugs.
6) Patients lost to 30 days post-operative follow up.

Baseline characteristics of patients were noted on a predefined proforma on admission. Patients were categorised into 2 groups (body mass index (BMI) >25 kg/m2- overweight and patients with BMI < 25 kg/m2 - normal weight).Both groups underwent surgery by an experienced surgeon. All the patients were followed up for 30 days for post op complications.

Information was gathered about the patient's medical history such as pulmonary, cardiac or cerebrovascular disease, diabetes, hypertension, any malignancy, and height and bodyweight The Body Mass Index (BMI; kg/m2) was recorded. At discharge, the patients were given an information sheet to assess post-operative complications within 30 days of discharge. Patient were asked to fill up the sheet at 30 days post- operative and share it's copy on email or phone. Contact details were mentioned in the sheet along with the date on which the sheet has to be shared and consent for the same will be taken during primary consent. After data collection the findings were noted as per outcome table. Reminder phone call was given twice for the investigation sheet to be submitted back.

Statistical Analysis

Data were analysed using SPSS (Statistical Package for Social Sciences, Version 15.0) package. Data were given as Mean, SD and N for continuous data and Number and Percentage for categorical data. Fisher Exact Probability tests were applied to compare percentages for categorical data between 2 groups. Chi square test was applied to compare percentages of more than 2 groups.

All statistical tests will be two tailed. Alpha (α) Level of Significance was taken as $p<0.05$. S=Significant, NS=Not Significant, DF=Degrees of Freedom and P=Probability value.

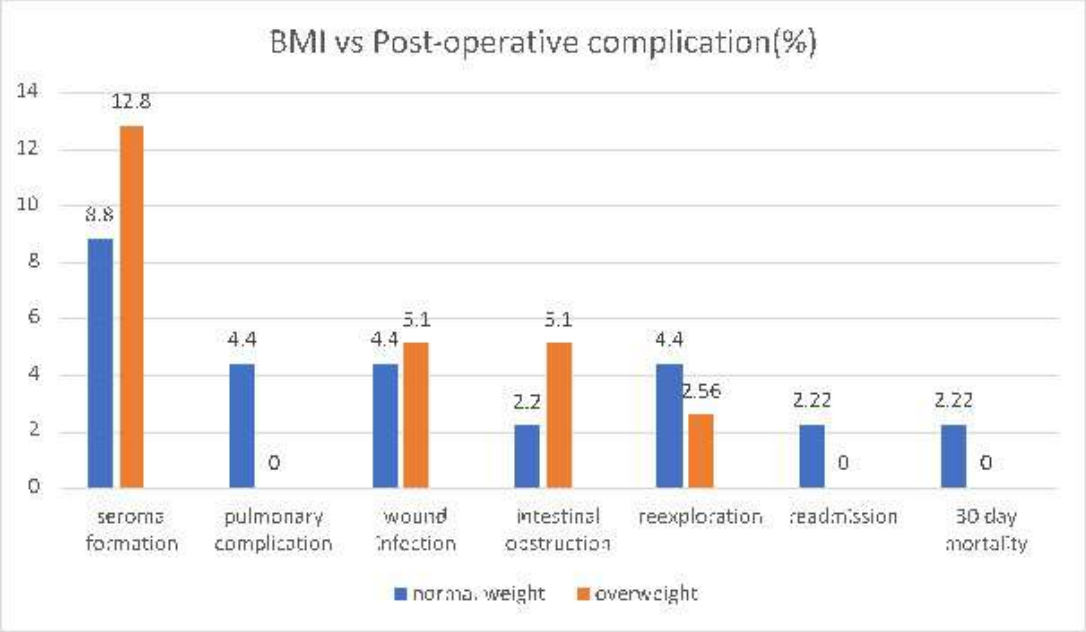
Results and analysis

Table 1. Demographics

	Normal weight (BMI<25 KG/M2)	Higher BMI (BMI>30 kg/m2)	P value
Age years (mean+/-SD)	57.02	57.4	P=0.7
BMI (mean =/-SD)	24.77	25	
Male[n(%)]	25(55.5%)	25(62.50%)	P=0.6
Female[n(%)]	20(44.4%)	16(39.02%)	
No comorbidities	5(11.11%)	7(17.7%)	
Diabetes	22(48.8%)	18(43.9%)	P=0.5
Hypertension	24(53.3%)	17(41.46%)	P=0.4
Heart disease	13(28.9%)	10(24.3%)	P=0.8
Pulmonary disease	9(20%)	6(14.6%)	P=0.8
Malignancy	21(46.7%)	21(51.2%)	P=0.7
Emergency surgery	7(15.5%)	8(19.5%)	P =0.6
Elective surgery	38(84.4%)	33(80.48%)	
Open surgery	32(71.11%)	27(69.23%)	P =0.5
Laparoscopic surgery	13(28.88%)	14(34.14%)	
Smoker	6(13.3%)	8(19.5%)	P =0.4
Non-smoker	39(86.6%)	33(80.48%)	

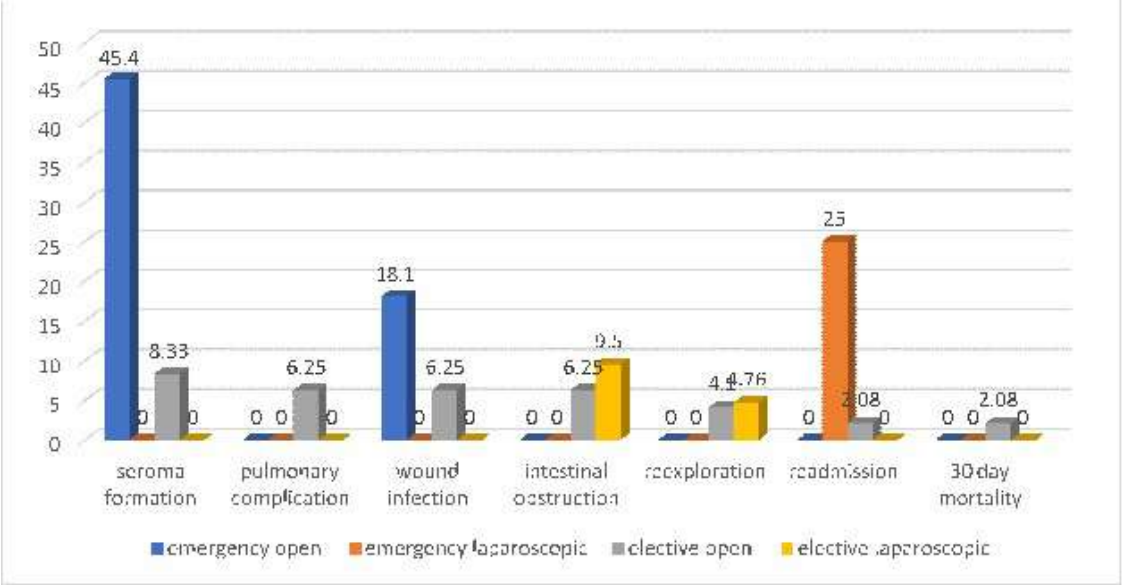
The p value of the above data calculated using chi square test and Fischer's exact probability test as statistical tests were found to have values that were not significant.

Figure 1. Bar diagram depicting association of BMI with post-operative complications



Complications were observed more frequently in patients undergoing emergency open surgeries and the most common complication being seroma formation (45.4%). Readmission rates were observed to be higher in emergency laparoscopic surgeries (25%). Seroma formation and wound infection was more commonly observed in patients undergoing emergency open surgeries.

Figure 2- Bar diagram representing association of post- operative complication with the urgency and type of surgery

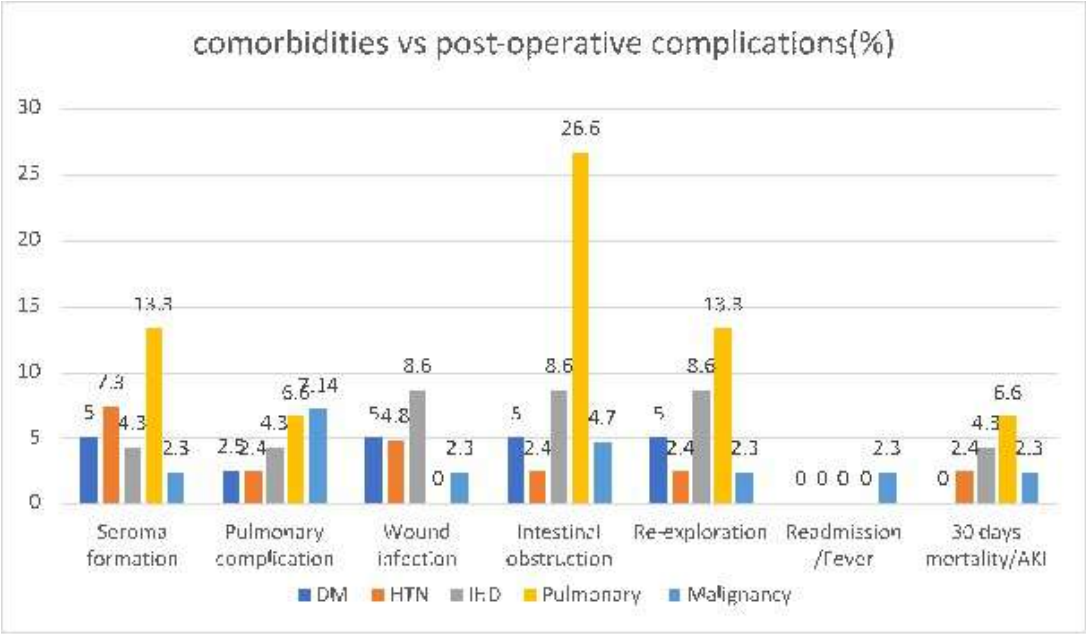


Patients having DM were found to have wound related complications more like seroma formation (5%), wound infection (5%), intestinal obstruction and re-exploration (5%). Patients having malignancy suffers more from pulmonary complications (7.14%). Intestinal obstruction was more common in patients with pulmonary complications (26.6%).

Table 2. Depicting association of post-operative complications with comorbidities

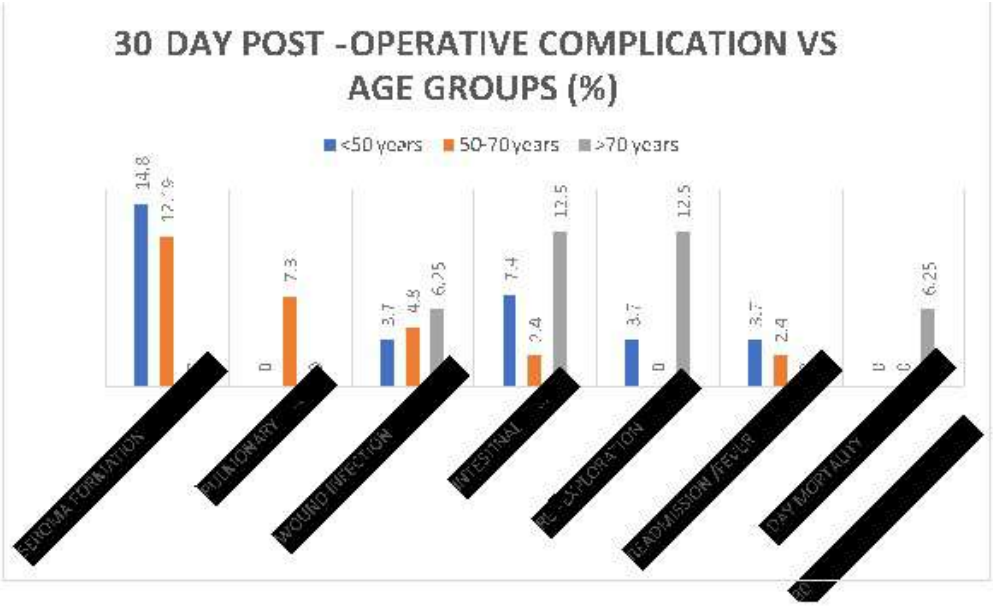
	DM(n=40)	HTN(n=41)	IHD(n=23)	Pulmonary (n=15)	Malignancy (n=42)
Seroma formation n (%)	2(5%)	3(7.3 %)	1(4.3 %)	2(13.3 %)	1(2.3%)
Pulmonary complicatio n	1(2.5 %)	1(2.4 %)	1(4.3 %)	1(6.6%)	3(7.14 %)
Wound infection	2(5%)	2(4.8 %)	2(8.6 %)	0	1(2.3%)
Intestinal obstruction	2(5%)	1(2.4 %)	2(8.6 %)	4(26.6 %)	2(4.7%)
Reexploration	2(5%)	1(2.4 %)	2(8.6 %)	2(13.3 %)	1(2.3%)
Readmission /Fever	0	0	0	0	1(2.3%)
30 days mortality/A KI	0	1(2.4 %)	1(4.3 %)	1(6.6%)	1(2.3%)

Figure 3. Bar diagram representing the correlation of comorbidities with post- operative complications



Post-operative complications were more commonly observed in age group of >70 years like wound infections (6.25%), intestinal obstruction (most common) (12.5%). Re-exploration rates and mortality was also high in patients >70 years age.

Figure 4. Bar diagram representing association of age groups with post-operative complications



It was observed that males developed more post- operative complications as compared to females. Intestinal obstruction was more common in males (8.16%). Females had more propensity to develop wound infections. 30-day mortality was seen in female.

Figure 5. Bar diagram representing correlation between gender and post-operative complications

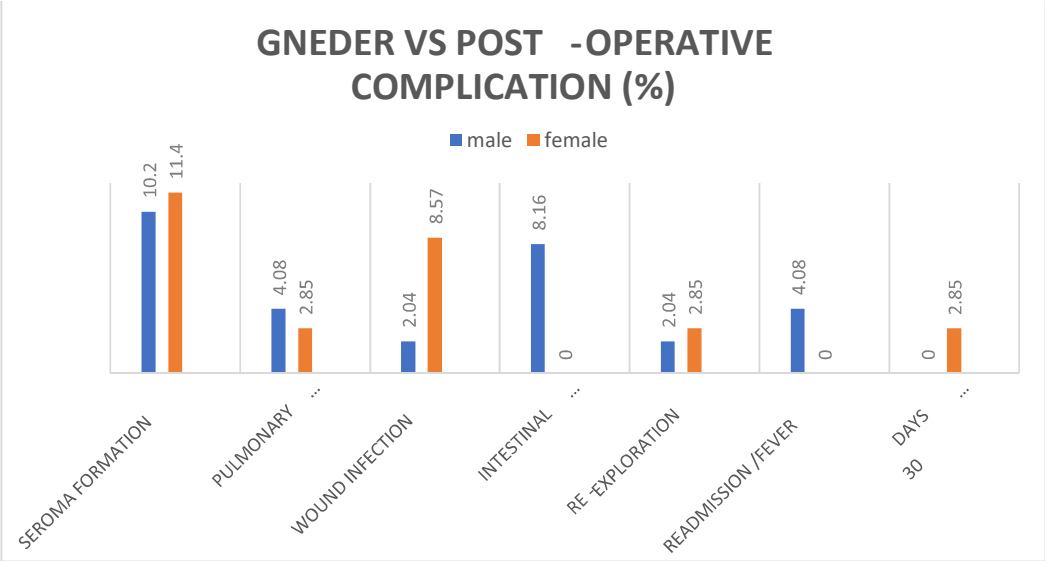


Figure 6. Wound dehiscence along with wound infection in a post- operative patient

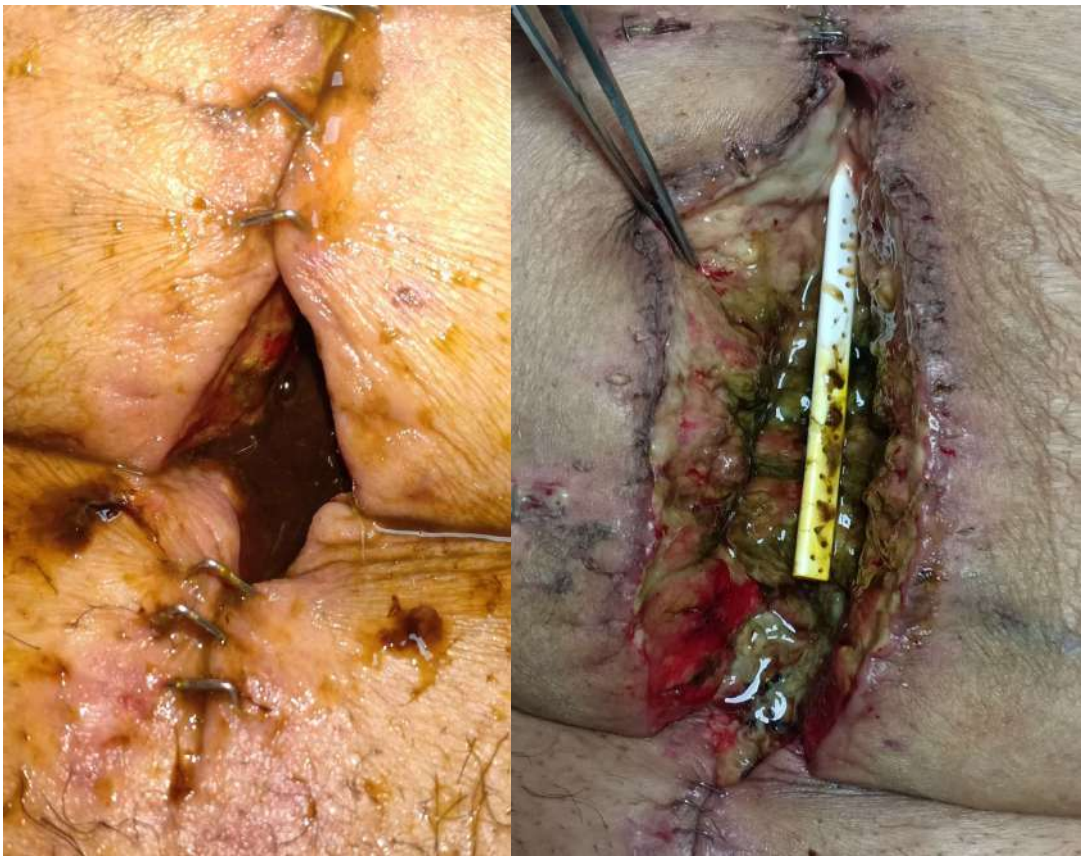


Figure 7. Wound dehiscence post open radical cholecystectomy

Discussion

Obesity is believed to be the risk factor for post-operative complications following surgeries. Although obesity is known to cause medical hazards, recent literature shows conflicting evidences to support this hypothesis. Also, there is an existence of a paradox between body mass index and survival found. This study is designed to determine the impact of higher BMI on early post-operative complications following abdominal surgeries.

This is a prospective cohort study conducted over a period of 1 year.

A total of 86 patients undergoing abdominal surgeries both open and laparoscopic and in emergency or elective procedure during the study period was included in this study. The mean age group in this study is 57.2 years, including 35 females and 49 males. Sex ratio being 1:5(male: female) with a mean BMI of 24.7 kg/m2.

Out of these, around 53.6% patients were found to have normal weight (BMI< 25 kg/m2) and 46.4% patients were found to have higher BMI (BMI>25 kg/m2). When compared to age, median age group studied in this study is 57.2 years. Out of which the mean age belonging to normal weight category is 57.02 years and that belonging to higher BMI category is 57.4 years. There was not significant difference in age and BMI of the patient (p=0.7).

There were many other studies conducted on larger populations and longer duration as follows:

In a retrospective study conducted by Haider Mahdi et al(15) over a period of 6 years from 2005-2011 on a larger population of 3947 found that after surgery for endometrial cancer, 50% of the patients were in the normal weight category and 49% were in the higher BMI category, with a median age of 64.7 years in the normal weight category and 63.1 years in the higher BMI category. Age groups and BMI categories did not differ significantly. Stevens et al. [16] in his study conducted to see association of higher BMI and mortality observed that the association is age- dependent. Mortality was increased in obese adults up to the age of 74, whereas this effect declined in older age. Calle et al. [17] conducted a similar study to see association of higher BMI with age group found that the risk of death from all causes increases throughout the range of moderate and severe obese . He found an U-shaped association between higher BMI and age groups, with an increased risk in the lowest and highest percentiles of the distribution. Landi et al. [18] studied 18,316 patients to identify the relationship between age, BMI, and mortality. They found that death rates increased at the lowest and highest BMI rankings in younger patients. Galanos et al. [19] studied critical care patients to find similar association between higher BMI and age group nut could not reproduce the U shaped curve. His study suggested a protective effect with BMI>30 kg/m2 probably due to the increased nutritional reserve which the higher BMI patients had. However, this study was performed on patients with medical conditions, not surgical.

In the present study, there are 55.5% of male belonging to normal weight category and 64.10% males belonging to overweight category. On the other hand, among females, 44.4% are normal weight and 35.8% are overweight in this study (p value=0.5).

When BMI was compared to comorbidities, HTN was more common among normal weight individuals i.e., 53.3% whereas malignancy was more common among higher BMI patients i.e., 53.8%. Although other comorbidities had no significant difference in normal weight and higher BMI patients. Their p values were as follows-

DM (p value= 0.5), HTN (p value=0.4), IHD (p value=0.8), pulmonary condition (p value=0.8), malignancy (p value= 0.7)

The comorbidities in the present study are more common in age group of 50-70 years, DM being the commonest 6.5%

Al Muhim et al. [20], in 2014 conducted a review of literature on obesity disease and surgery.

In that he states effect of various general disease associated with obesity as follows-

Diabetes mellitus- Obesity is highly associated with development of type 2 DM among all ages. This may be because of the common association between obesity and metabolic syndrome, impaired fasting glucose, and impaired glucose tolerance.

Hypertension - Generalized and central obesity increase the risk of arterial hypertension. As high blood pressure and impaired glucose tolerance are associated with obesity, it has been suggested that hyperinsulinemia could represent one of the pathogenic connection between obesity and

arterial hypertension. Age, race, and sex may alter the frequency of hypertension in obese patients.

Heart Diseases-Obesity is considered a risk factor for coronary artery disease, heart failure, and atrial fibrillation. It is more prevalent in females as compared to males. Obesity has a strange association with heart failure that is called obesity paradox (as well as other diseases). It can result in systolic and diastolic dysfunction, on the other hand, obese patients with heart failure have better clinical outcomes in comparison to patients with normal BMI. Obesity has also higher risk for atrial fibrillation incidence, recurrence, and poor prognosis.

Respiratory Diseases-Obesity is a risk factor for several respiratory diseases like obstructive sleep apnoea and bronchial asthma. Obesity also has a significant impact on bronchial asthma risk, severity, and control.

Malignancies-Obesity is associated with higher cancer incidence, recurrence, progression, and death. It can be responsible for the following cancer types:

(1) gastrointestinal system
(2) hepatobiliary system
(3) breast malignancy
(4) endometrial , ovarian, cervical malignancy
(5) lung malignancy
(6) skin malignancy
(7) multiple myeloma
(8) leukaemia

The increased risk of cancer mortality associated with an elevated BMI is significant at levels above 30 kg/m2.

In this study, maximum overweight patients underwent emergency surgeries (20.5%) whereas normal weight patients underwent elective surgeries more (84.4%). Also, open abdominal surgeries were preferred for both normal weight (62.2%) and overweight patients (51.28%) in cases of elective surgeries. Overall, in case of emergency laparoscopic approach was preferred irrespective of BMI status.

Open approach is also popular in elective surgeries in both normal weight and higher BMI individuals in cases of elective surgeries depending on the complexity of the procedures to be performed.

In this study, the mean length of hospital stay was 9.4 days for normal weight patients and 8.7 days for higher BMI patients. The length of hospital stays as observed in this study was more in patients undergoing open surgeries as compared to patient undergoing laparoscopic surgeries. Patients undergoing laparoscopic surgeries had faster recovery and less hospital stay.

In other studies, findings related to length of hospital stay was as follows:

In a study conducted by Klassen et al. [21] the mean length of hospital stay post- surgery was 17.7 days in normal weight individuals and 21.2 days in higher BMI patients.

Similarly, in study of Haider Mahdi et al. [15] (3.4 days in normal weight and 6.5 days in higher BMI individuals) and J T Mullen et al. [22,23] (13.5 days in normal weight and 10.3 days in higher BMI individuals), the mean length of hospital stay was more in higher BMI patients.

In the study conducted by Tjeertes et al(24), the mean length of hospital stay was more in normal weight patients i.e., 10 days in normal weight individuals and 4 days in higher BMI patients.

Postoperative complications-

In present study, most common complication that occurred post-surgery is observed to be seroma formation that is more common in higher BMI patients. (12.8%) (p value=0.6)

Other complications like, wound infection (no significant difference found) 4.44% in normal weight and 5.1 % in higher BMI. Intestinal obstruction is found to be more common in higher BMI individuals (2.22% in normal weight and 5.1% in higher BMI). Pulmonary complications (4.44%), re-exploration (4.44%), readmission and fever (2.22%), mortality and AKI (2.22%) were found to be more common in normal weight individuals as compared to higher BMI individuals.

In a retrospective study conducted by Haider Mahdi et al. [15] in 2005-2011 to study impact of obesity on 30-day morbidity and mortality after surgery for endometrial cancer had following findings related to post-operative complications: Morbidly obese patients were at significantly higher risk of surgical site

infection (8.8% vs 3.3%; p = 0.001) and wound disruption (2.4% vs 0.6%; p= 0.001) than were normal weight patients. However, no difference was found between obese and normal weight patients for risk of SSI (4.6% vs 3.3%) or wound disruption (0.6% vs 0.6%). No difference between groups was found in the rate of septic shock [normal weight (0.3%); obese (0.3%); morbidly obese (0.4%)], or pneumonia [normal weight (0.7%); obese (0.9%); morbidly obese (1.1%)]. The risk of sepsis was significantly lower in obese patients compared with those of normal weight (0.7% vs 1.7%; p = .02), with no difference between normal weight and morbidly obese patients (1.7% vs 2%; p = .59). They concluded that morbidly obese females experienced more SSI and wound disruption. There was no difference between BMI groups in relation to hospital stay, surgical re-exploration, 30-day mortality.

Tjeertes et al. [24] conducted a single center prospective studies in 4293 patients over a period of 6.3 years and analyzed impact of bodyweight on postoperative morbidity and mortality using multivariate and univariate regression models. Obese patients required a longer operation time ($p < 0.001$), was associated with more intraoperative blood loss ($p < 0.001$) and higher rates of surgical site infection ($p < 0.001$). Underweight patients also had higher rates of complications than normal weight patients. Complication grades were different between groups, with more non self-limiting (>grade 1) complications in the underweight (25 %), overweight (16.9 %) and the obese (20.7 %), com- pared to (14.2 %)in normal weight patients (overall p-value $p < 0.001$).

They concluded that underweight patients have higher complication rates as compared to normal weight patients. Obesity is a significant risk factor for surgical site infection, more surgical blood loss and longer operation time. They found that incidence of surgical site infection increases with an increase in BMI.

John T Mullen [22,23], in 2008 conducted a similar study to study impact of body mass index on perioperative outcomes in patients undergoing major intra-abdominal cancer surgery on 2258 patients over a period of 4 years. It was a prospective, multi-institutional, risk adjusted cohort study on patient undergoing major intra-abdominal cancer surgery. Their findings regarding post-operative complications were as follows:

The mean total length of hospital stay was 13.5 for underweight group and 10.3 for higher BMI group but this difference was not statistically significant (p=0.95). The rate of return to operating room and major complications also had no significant difference. There was no significant difference in rates of systemic infection like respiratory, urinary tract, central nervous system, cardiovascular amongst BMI classes.

In their study they concluded that obesity can be considered as risk factor for wound infections only. Other complications were more frequently observed in underweight group of patients. Rate of reoperation was also more in underweight patients. Mortality rates were also increased among underweight as compared to higher BMI patients.

In a study conducted by Bamgbade et al. [25], to study postoperative complications in obese and nonobese patients in 2006 also concluded that, obese patients have higher risk of myocardial infarction, wound infection, nerve injury and urinary tract infection. Obesity is an independent risk factor for perioperative morbidity.

In this study, the effect of other factors like type of surgery (emergency or elective), age, sex, comorbidities on post-operative complications are also studied to rule out confounding factors. The results were as follows:

The complication of seroma formation was more common in open surgical approach (45.4%). There is no significant difference in other complications like pulmonary complication, readmissions. Overall, most complications are common in open surgical approach rather than laparoscopic. Wound infections were also common in open surgical approach. Complication was intestinal obstruction was more common in laparoscopic approach.

Patients having DM were found to have wound related complications more like seroma formation (5%), wound infection (5%), intestinal obstruction and re-exploration (5%). Patients having malignancy suffers more from pulmonary complications (7.14%). Intestinal obstruction was more common in patients with pulmonary complications (26.6%). Post -

operative complications were more commonly observed in age group of >70 years like wound infections (6.25%), intestinal obstruction (most common) (12.5%). Reexploration rates and mortality was also high in patients >70 years age .When compared to sex of patient, it was observed that males were more frequently associated with postoperative complications. Females had more tendency to develop wound infections (75%). Male had intestinal obstruction as most common complication.

Conclusion

The present examination is an observational potential cohort taking a look at concerning 86 sufferers who underwent abdominal surgical procedures both open and laparoscopic and in emergency or optionally available manner conducted over a length of 1 year. Based on facts and consequences acquired in the present observation, the subsequent conclusions are obtained:

- there has been no full-size difference found in early post-operative complications following abdominal surgical procedures of sufferers in normal weight and higher BMI categories.
- overweight patients have been more common in age group of 50-70 years.
- whilst categorized as in keeping with BMI, normal weight patients had greater comorbidities consisting of dm, htn, ihd, pulmonary circumstance except for malignancy which was common in higher BMI group.
- most comorbidities had been determined in age organization of 50-70 years, out of which dm is most common. Malignancy is more commonly found in age group of <50 years.
- Maximum higher BMI patients underwent emergency surgeries whereas normal weight patients underwent elective surgeries more.
- Open abdominal surgeries were preferred for both normal weight and higher BMI patients in cases of elective surgeries . Overall, in case of emergency laparoscopic approach was preferred irrespective of BMI status.
- Maximum time spent in the hospital was within the range of 5-10 days.

BMI of the patient did not affect the length of hospital stay.

- When compared to type of surgery, patients who underwent open surgeries had maximum length of hospital stay as compared to laparoscopy. Patients undergoing laparoscopic surgeries had faster recovery and less length of hospital stay.
- Seroma formation was the most common complication observed in both normal weight and overweight patients. Seroma formation was mostly seen in higher BMI patients followed by wound infection and intestinal obstruction.
- Complications were observed more frequently in patients undergoing emergency open surgeries and the most common complication being seroma formation. Readmission rates were observed to be higher in emergency laparoscopic surgeries. Seroma formation and wound infection were more commonly observed in patients undergoing emergency open surgeries.
- Patients having DM were found to have wound-related complications more like seroma formation, wound infection, intestinal obstruction and re-exploration. Patients having malignancy suffer more from pulmonary complications. Intestinal obstruction was more common in patients with pulmonary complications.
- Post-operative complications were more commonly observed in age group of >70 years like wound infections, intestinal obstruction (most common). Re-exploration and mortality became additionally excessive in sufferers >70 years age
- it is found that males developed more post-operative complications then females.
- intestinal obstruction turned to be more common in men. Females had extra propensity to develop wound infections. 30-day mortality was seen in females.

Conflicts of interest

The authors declares that they do not have conflict of interest.

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LETTER TO THE EDITOR

Addressing Resident Burnout Syndrome: Exploring Effective Interventions

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India is globally recognized as one of the largest contributors to human resources in the healthcare industry. In recent years, the Government of India has taken all efforts to increase the training positions in broad and super specialties according to the national needs and ever-increasing market demand. At any given point in time, we have thousands of doctors undertaking their residency training at health university-affiliated teaching hospitals or National Board of Examinations in Medical Sciences (NBEMS) recognized institutions in our country. We are all aware that, admission to residency programs in India is highly competitive, with only the best and brightest medical professionals making it out for these programs. It is a matter of concern that residents experience a high quantum of stress and burnout while enduring their demanding training schedules. Despite being a long-standing concern within the medical fraternity in India, there has been no unified approach to address the issue of burnout among medical residents so far.

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Resident Burnout Syndrome can be defined as a state of emotional, physical, and mental exhaustion caused by prolonged exposure to chronic stress in medical residents. It is characterized by feelings of depersonalization, cynicism, and reduced personal accomplishment. The issue has been viewed from an occupational mental health perspective by several researchers and attempts have been made to compute the burnout-related mortality and morbidity in healthcare practitioners [1]. The Maslach Burnout Inventory (MBI) has been extensively used across the globe and in India to study the prevalence of burnout among medical practitioners. The three subscales under which burnout was evaluated so far included emotional exhaustion, depersonalization, and reduced personal accomplishment [2]. Although, the residents as a group are at risk for mental health issues equally like the general population, the complexity of their work stress can compound their vulnerability.

The inclusion of a comprehensive review of the scientific validity of all studies relevant to the subject matter is beyond the scope of this article, as such a

task is more appropriate for psychiatrists and psychologists in India. In our discussion, we are focused on tackling the challenge at hand, as the problem statement has been clearly defined. Some noteworthy concerns include extended working hours, a significant workload, poorly organized shift schedules, interpersonal conflict due to overbearing attitudes of professional colleagues, bullying, harassment, insensitive hospital management practices, and hectic competition amongst residents for opportunities to learn skilled tasks, etc. to name a few. The list of reasons for burnout is extensive and may vary depending on the field of specialization. For instance, the high levels of stress and emotional exhaustion faced by medical specialists can be attributed to the overwhelming volume of cases they must manage within tight timeframes [3]. Similarly, residents in surgical fields are susceptible to burnout given the highly demanding nature and long duration of their work [4]. Similarly, anaesthesia and critical care specialties, which involve high-stress environments and decision-making under pressure, can lead to burnout among practitioners, who often face emotional and physical strain while managing critically ill patients [5].

The traditional reasons for burnout have been well documented in the literature. We would rather delve into some wicked problems faced by residents rather than re-surveying the explored territory. The issue of long working hours and undergoing training at a high-volume center poses an unavoidable risk to residents' mental health. A thorough examination is required to assess the impact of residents' back-to-back shift work on their performance, as well as its potential to contribute to medical errors and reduced effectiveness. Residents in specialties like emergency medicine, anaesthesia, critical care, and all major surgical specialties are incidentally prone to tremendous pressures at the workplace, which requires no detailed explanation.

The fundamental reason which makes even the most resilient and talented resident suffer mentally is the pace at which he/she needs to master things and pick up the nuances of practice wherein there is often an absence of time to back up the knowledge base in the specialty during the first year of residency. Similarly, the reason for chronic burnout stems from the lack of a transition or switch in the roles of the resident during the following years. Moreover, after undergoing several months of training, it is reasonable for a resident to aspire to advance from a passive role to a proactive leadership position in decision-making, which is sometimes denied leading to an abrasive interpersonal work ethos. The constant scare of inadequate training and delay in gaining confidence to manage cases independently frustrates many residents to the core. For instance, a surgical resident expects more than being a 'retractor holder' in the operating room and a 'patient sitter' in the post-operative wards. The District Residency Programme (DRP), spearheaded by the National Medical Commission (NMC), is a significant initiative undertaken by the government to prioritize practical experience and skills training for medical residents. The DRP in turn will also help the masses in the hinterland with specialist health services. However, the only bottleneck for a successful implementation of this program is the lack of adequate infrastructure at the proposed workplaces for residents.

The actual leave policy of the institutions in 'practice' is a cause of

annoyance for residents as their requests often are denied even during utmost requirement. Similarly, the abuse of academic residents for run-of-mill work beyond the scope of their training at several hospitals is a matter of huge concern which is rarely reduced to black and white. By the same token, inter-departmental tussles at some training institutions make residents soft targets for consultant-level feuds. Needless to say, violence against doctors is also an emotional challenge being faced by all healthcare personnel these days, of which residents face the maximum brunt by being at the front line in teaching hospitals.

The interventions to address the key issues discussed in this article are summarised and tabulated hereunder in Table 1.

Table 1. Issues and Interventions in Resident Burnout

S.No.	Level of Intervention	Issues/Themes	Measures
1	Resident	Coping, interpersonal relations, training activities, relaxation, and dedication.	• Seek help from co-residents in the event of a huge workload. • Should foster a collaborative approach than a competitive approach towards fellow residents. • Make time for physical activity and follow a healthy lifestyle. • Strive to create a special social niche at the workplace for emotional well-being. • Speak out if they feel something is wrong as early as possible before things pent up and grudges start dawning in. • Participate in occupational health training organized at all levels. • Respond to the emotional needs of their colleagues as suicides don't need strong reasons but weak moments can make people throw away their lives. • Try to adapt to work Schedules and take adequate rest between shifts. • Compartmentalize personal and professional life but gauge the priorities during the training period (because our profession demands some sacrifice). • Speciality training is something one learns while on the job and connects the dots later. So, residents should not worry about the theoretical side of their training because it ensues in due course.

2	Institution	Consultants/Faculty attitudes towards residents, Sexual harassment committee, Inter-departmental tussles, leave policy in practice, recruitment of non-academic residents, motivation of residents, bullying, violence against residents, implementation of post-night duty offs	• The Chief Consultant/Head of the Department is the *loco parent* for the resident and can find any solution for his/her problem. Hopefully, they should never be a source of it. • The head of the institution should constitute sexual harassment at the workplace committee and facilitate reporting and inquiry. • Dean/Management should ensure smooth inter-departmental coordination. • Vacation/leave planning meetings should be organized well ahead regularly, and all the residents should sort this with a consensus. • Comply with the rules and regulations of the regulating agencies. • Organise in-house common dining at least once a fortnight to have an informal discussion about resident-consultant dynamics. Formal meetings are counterproductive as residents rarely speak out in meetings. • Experiment with novel ways to increase socialization amongst the entire medical and paramedical teams. • Initiate programs like rewarding best performing residents every month and also try to publicly display patient's feedback on resident's work. • Institutions should create an online padlet wall to talk about bullying and interpersonal issues freely amongst the stakeholders which can pave the way to openly conduct any inquiry in the event of a complaint. • Institutes should facilitate the conduct of self-defence training for all residents and also have a quick response team support to manage any untoward violence. • Institutions should try to harmonize at stretch working hours of residents and provide post-night duty offs wherever possible. Shift work schedules should be compressive and follow the forward rolling scheduling model wherever possible. • Delineate the functional roles and responsibilities of residents of each

			professional year in tune with the competency-based approach. • Introduce skills lab activities for residents wherever necessary and feasible. • Implement academic activities in letter and spirit.
3	Health University/ NBEMS/ NMC	Awareness, training, and regulation	• Apex agencies should order the implementation of multi-centric job hazard analysis of medical residents' work by using institutional profiles and specializations as two important criteria for categorization and assessment. An action plan for interventions at all levels should be drawn out and compliance ensured. • Organize regular webinars about coping and resilience in fighting burnout at the beginning of every postgraduate academic session. • Create a training module on occupational mental health by roping in experts from the fields of community medicine, psychiatry, and medical education unit (MEU) departments. • Make gatekeeper training for suicide prevention and occupational wellness training mandatory for all residents to appear for final professional examinations. • Ensure swift resolution of resident grievances. All they need sometimes is just an active listener to their concern. • Propose a competency-based delivery of curriculum model so that the training is more structured and uniform. It is a time for the revision of PG regulations by the NMC. • Issue guidelines for hiring non-academic residents in all institutions after thorough research on the subject based on the workload.

The Ethics and Medical Registration Board (EMRB) of the NMC recently published guidelines for the professional responsibilities of medical teachers and students. The guidelines prioritize the holistic development of stakeholders, based on the principle of social responsibility, which is aligned with the national requirements [6,7]. The increased need for extra cautious academic activity in the light of Competency-Based Medical Education (CBME) for

undergraduates has also put the residents under pressure in teaching hospitals where there is a faculty crunch.

Before we conclude, a note on rampant substance abuse among medical residents is worth a mention because it is often viewed as a solution to beat stress (albeit with the potential to become a source of it, if things go astray!). These habits can destroy the personal and professional life of medical residents eventually. Creating a supportive environment to discuss substance abuse issues in a non-judgemental manner without any serious repercussions will help the residents express and fight this challenge. Similarly, the average age of the resident population generally falls within the young adult range. The personal lives of these growing adults are always under the stress of transformation and the prevailing social culture of *Fear of Missing Out (FOMO)* can increase their vulnerability to mental health issues. A proactive and facilitative work atmosphere can help residents tide over the family and relationship stress also.

In conclusion, resident burnout syndrome is a matter of importance not only for the personal well-being of the residents but can also have serious implications for patient care and also increase the likelihood of medical mishaps. There is a strong urgency to recognize and quantify the problem which will pave a way for thinking about interventions at all levels to mitigate occupational burnout among resident doctors in India.

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CASE REPORT

An interesting case of a mucinous cystadenoma of a horseshoe kidney in a middle-aged woman

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Abstract

A 48-year-old female presented with complaints of right sided vague abdominal pain associated with abdominal lump.. Computed tomography revealed horseshoe kidney with Bosniak IIF cystic lesion arising from the interpolar region of right segment of the horseshoe kidney (HSK). In view of the persistent pain, patient underwent cyst excision. The final histopathology diagnosis was mucinous cystadenoma. On follow-up at 6 months post surgery, there was no recurrence. The histopathology is very unique and rare with only a few cases recorded in literature. The inner lining of the cyst wall composed of columnar epithelium secreting mucin and at some places by transitional epithelium. This indicates that the origin of the mucinous tumour was likely to be from a sequestration of the renal pelvic urothelium in the renal parenchyma.

Keywords: Horseshoe kidney, Mucinous cystadenoma, renal cyst, Boniak

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Introduction

The occurrence of a primary mucinous cystadenoma in a horseshoe kidney is a very rare case with only 3 cases reported in literature [1-4]. We would like to describe our case as the fourth one to add to the literature of this rare clinical scenarios.

Case Report

A middle aged female of age 48 years presented to the urology outpatient department with complaints of vague right sided intermittent abdominal pain over a period of 6 months. An ultrasound of the abdomen revealed horseshoe kidney with a well-defined hyperechoic lesion with some hypoechoic areas within the lesion arising from the interpolar region of the right segment. Patient was then further evaluated by Contrast enhanced computed Tomography of the abdomen and pelvis which revealed a horseshoe kidney with the lower poles of both the kidneys fused anterior to the abdominal aorta at the level of L3 lumbar vertebra with the isthmus measuring 11 mm in diameter. There was evidence of well-defined hypodense non-enhancing cystic lesion of size 7.3 cm *6.5 cm *7 cm in dimensions in the retroperitoneal region arising likely from the interpolar region of the right division of the horseshoe kidney compressing and displacing right renal hilum. The cystic lesion shows few thick calcified non enhancing septae and multiple peripheral wall calcifications suggestive of Bosniak type IIF lesion (Figures 1 to 3).

Figure 1. CECT scan of abdomen and pelvis showing Bosniak II F lesion arising from the interpolar region of the right segment of the horseshoe kidney (Arterial phase-axial cuts)

Figure 2. CECT scan horseshoe kidney with the cyst and the isthmus at the level of L3 vertebra.

Figure 3. Coronal section cuts of CECT scan showing the origin of the cyst from the Right segment of the horseshoe kidney.

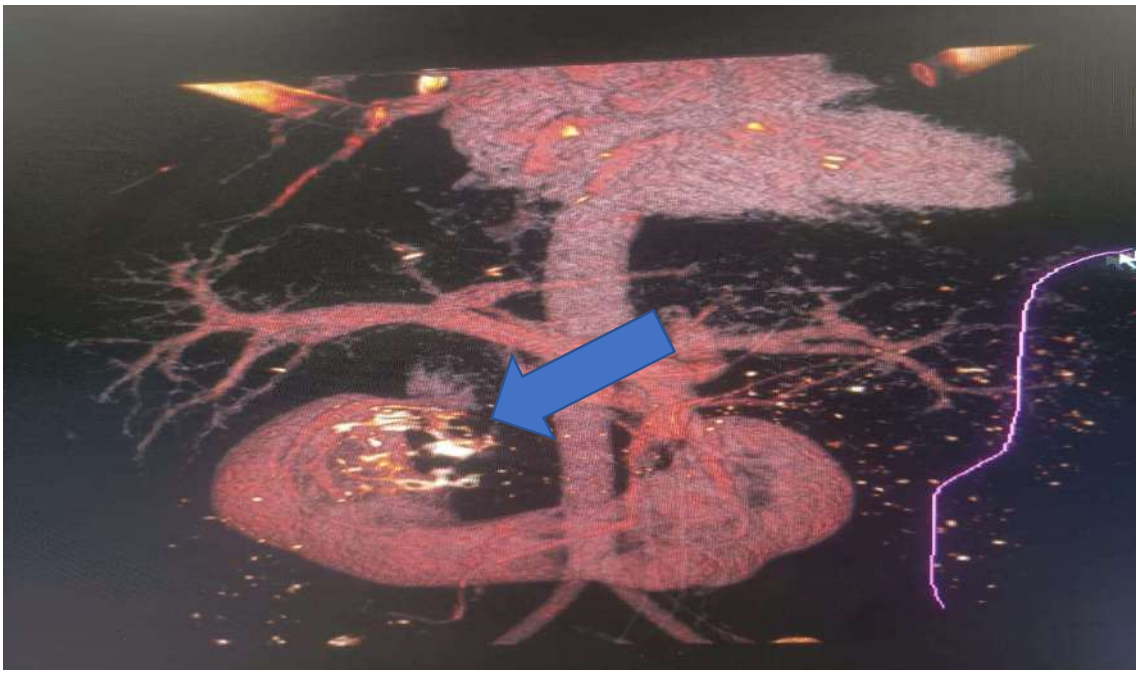

Figure 4. Reconstructed CT image of the horseshoe kidney with the origin of the cyst from the interpolar region of the right segment (arrow showing the cyst)

In view of the persistent pain, patient was planned for cyst excision. The cyst excision was done by an upper midline abdominal incision. After careful mobilisation of the right colon and kocherisation, the Right sided segment of the HSK along with the cyst was exposed. After meticulous dissection, the cyst was carefully dissected out from the renal parenchyma away from the renal hilum and excised in toto. On cutting open the cyst; it was found to contain mucinous material. The procedure was uneventful. Patient was discharged 5 days after the procedure (Figures 4-9).

Figure 5.Preoperative photograph of the patient's abdomen marked with the location of the abdominal lump using a marker.

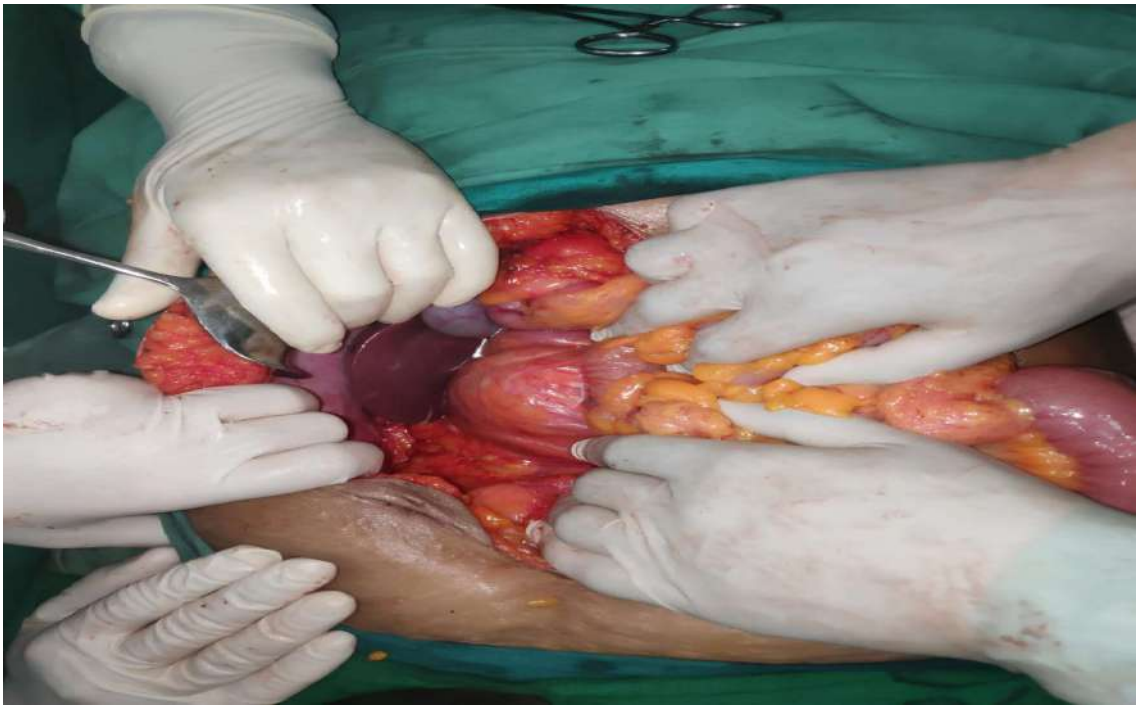

Figure 6. Shows the relation of the cyst to the liver, duodenum and the colon.

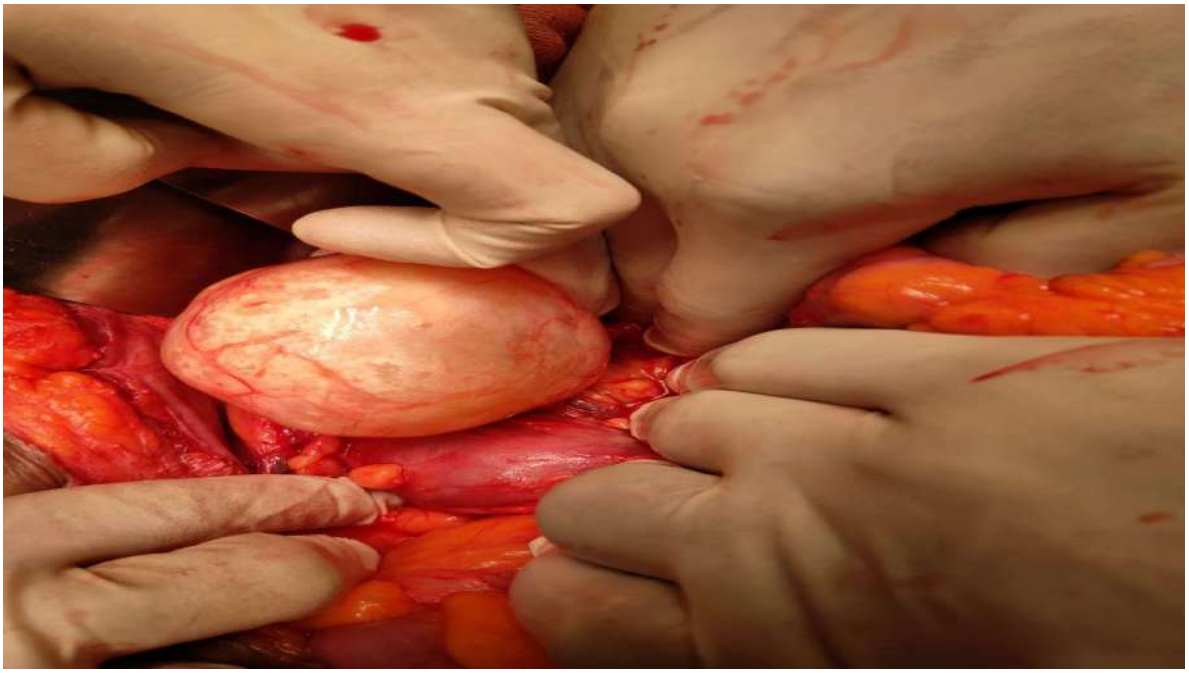

Figure 7. Shows the relation of the cyst to the right segment of the Horseshoe kidney.

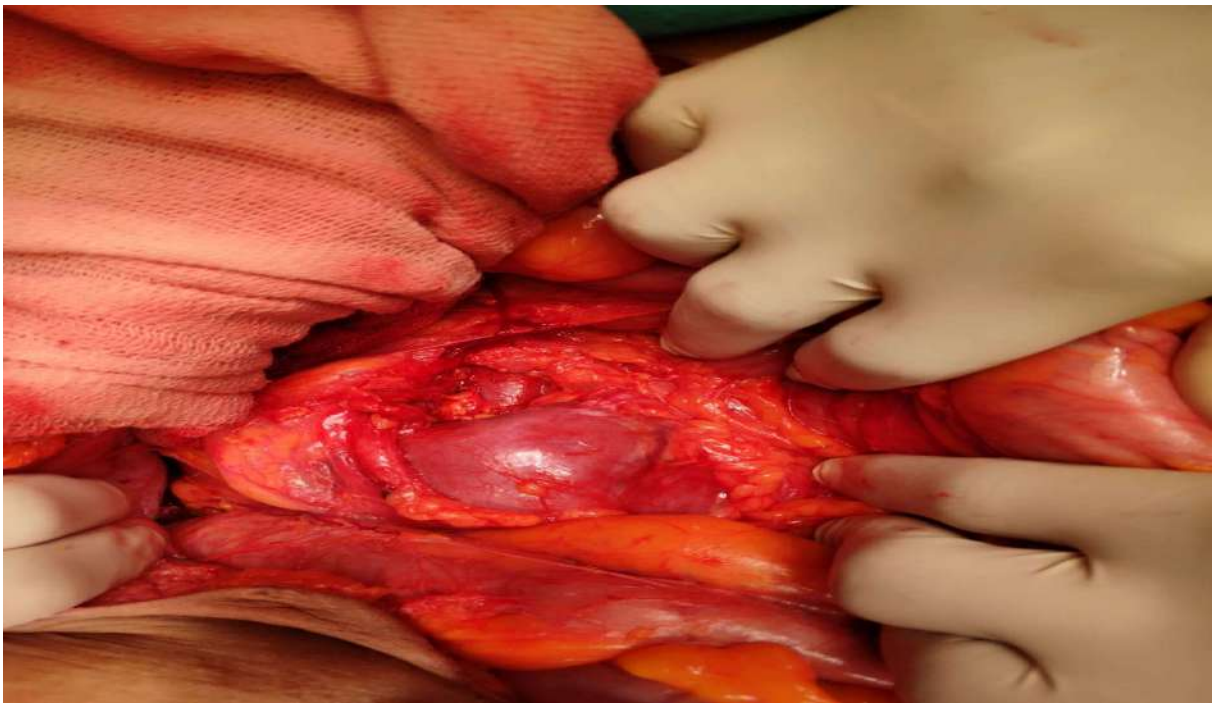

Figure 8. Shows the right segment of the horseshoe kidney along with the isthmus after complete removal of the cyst.

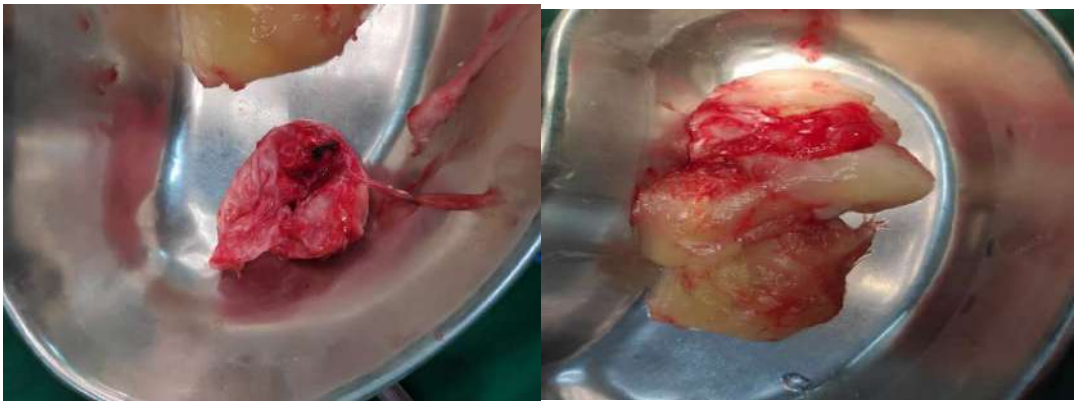

Figure 9. Shows cyst cut open with mucinous contents.

The final histopathology report revealed a fibromuscular cyst wall lined by a single layer of mucin secreting columnar lining epithelium admixed with transitional epithelium at some places. The fibromuscular wall was seen densely infiltrated with chronic inflammatory cells composed of lymphocytes and plasma cells. These findings were suggestive of final diagnosis of mucinous cystadenoma of horseshoe kidney. The patient has been on regular follow up post-surgery. There is no recurrence over a period of 6 months.

Discussion

We describe an extremely unique case of mucinous cystadenoma in a horseshoe kidney. To our knowledge, there have been only 14 reported cases of mucinous cystadenoma of the kidney, and only 3 of such cases have been described in a horseshoe kidney. These tumors cannot be distinguished from a renal cyst based on clinical examination

findings, laboratory data, and imaging studies. None of the previous reports correctly diagnosed the disease before surgery; the final diagnosis was made only after the tumour was excised and final histopathology report was obtained. The density of simple renal cysts ranges from −10 to +20 HU on CT [3]. With our patient, the density of the cystadenoma ranged from 10 to 20 HU but with few septae and few calcifications and the radiologic features mimicked a renal parenchymal cyst- Bosniak IIF [3]. Also because of some floating membranes seen on ultrasound by the radiologist, even a differential diagnosis of hydatid cyst was on the cards. Mucinous cystadenoma of the kidney may therefore be missed by routine imaging studies. In the previous reports, the cystadenoma originated from the urinary collecting system in 8 cases and from the renal parenchyma in the remaining 4, based on histological findings [1-10]. Some theories by authors have postulated that the development of mucinous cystadenoma with an intestinal phenotype in the kidney involves urolithiasis, infections, or both, and these events may induce intestinal metaplasia [7]. In contrast, Liwnicz and colleagues suggested that the mucin secretion from the cystic tumour may be the cause of the stones [11]. On the other hand, other authors have speculated that from a sequestered segment of the renal pelvic uroithelium in the renal parenchyma, especially in the case of an anomalous kidney, such as a HSK have been associated with such mucinous tumors [3,4]. In cysts arising from the renal parenchyma, which include the 2 cases reported in horseshoe kidneys, the inner surface was not covered by urothelium. In our case, the histopathologic findings demonstrated an inner surface of the cyst covered by a mucin positive columnar epithelium admixed with transitional epithelium, suggesting that the origin of the mucinous tumour was likely from a sequestered segment of the renal pelvic epithelium.

Conclusion

We report an extremely unique interesting case of mucinous cystadenoma in a HSK. Thus, we conclude that horseshoe kidneys present with unique challenges to the urologist in his clinical practice.

Author Contributions

Ojas Vijayanand Potdar (Corresponding author): Design, patient history taking and writing the manuscript of the case report. Kaustubh Vaidya: Writing the manuscript of the case report. Mohammed Ayub Karamnabi Siddiqui- Design of the case report. Vivek Shaw: Patient history taking. Darshan Rathi- Images of the radiological investigations. Amrita Vikram Patkar: Writing the manuscript of the case report.

Conflicts of interest

The authors declares that they do not have conflict of interest.

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CASE REPORT

Delleman Syndrome: Oculocerebrocutaneous Syndrome: A Case Report

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Abstract

Delleman Oorthuys syndrome or oculocerebrocutaneous syndrome is a rare congenital disorder. It is sporadic. As the name suggests it involves integumenatry system, central nervous system and eyes. Here we present the case of a newborn male baby who presented with congenital hydrocephalous, left sided eyelid coloboma since birth along with other features of this syndrome. Goldenhar and Goltz syndrome may also present with similar features. There is need to diagnose this congenital anomaly as a separate entity for better management and prognosis of such children.

Keywords: Cystic eye, Delleman syndrome, congenital hydrocephalous, eyelid coloboma

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Introduction

The syndrome of orbital cyst and anophthalmia (microphthalmia), perioccular appendages, skin tags, cerebral cysts along with other cerebral anomalies with focal dermal hypoplasia was first described by Delleman et al. in 1981[1-4]. Based upon the combination of features of presentation it is also called as oculo-cerebro-cutaneous syndrome. It is named after the scientists who have described it.

Case Report

A male newborn was admitted on day 1 of life with antenatally diagnosed hydrocephalous. He was born out non consanguinous marriage among healthy parents. Baby had gross hydrocephalous.

On further and detailed examination patient found to have left upper eyelid coloboma with redness and a fleshy growth over the supero-temporal aspect of the bulbar conjunctiva left eye. It was also noticed that the patient had temporo-parietal alopecia on the affected side. Patient also had sacral meningocole which was already ruptured.

Birth history was normal, and he was the first child of his parents. The rest of the body had no other area of skin appendages anywhere else. Examination of the right eye was normal. Systemic evaluation revealed no abnormality (Figure 1).

Figure 1. Left upper eyelid coloboma with redness and a fleshy growth over the supero-temporal aspect of the bulbar conjunctiva with parietal alopecia

MRI of brain was done which showed multiple small gyri in left cerebral hemisphere with shallow sylvian fissures with left sided subdural collection with hemorrhages, dilated ventricles, small brain stem and cerebellar hemispheres with large retro-cerebellar cystic lesion.

MRI of spine shows low lying spinal cord; two hemicords in sacral spinal canal with separate thecal sacs and a septum is seen traversing the spinal canal along with a small collection in skin and subcutaneous fat plane in the sacral region posteriorly (Figures 2 and 3).

Figure 2. Ruptured sacral meningocoel.

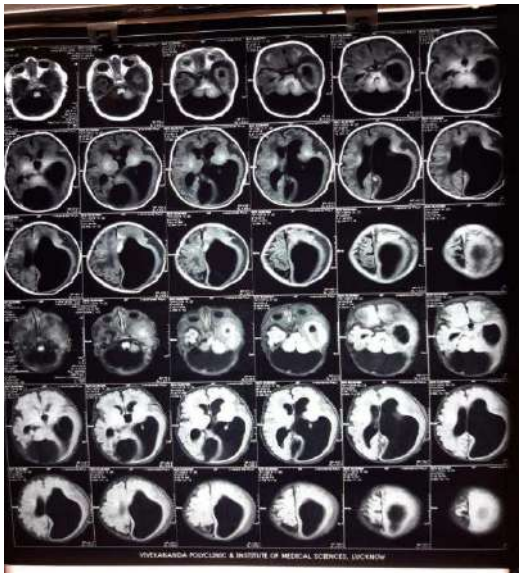

Figure 3. Left cerebral hemisphere with shallow sylvian fissures with left sided subdural collection with hemorrhages, dilated ventricles, small brain stem and cerebellar hemispheres with large retrocerebellar cystic lesion.

Discussion

Delleman syndrome is a rare genetic disorder characterized by cutaneous and ocular abnormalities as well as areas of focal alopecia along with hydrocephalus [4].

It is seen more commonly in males and occurs sporadically. There is no risk of recurrence in the siblings and with no known etiological cause [5].

Asymmetry in features is characteristic of OCCS [2]. Our patient too had his ocular and dermatological features limited to only the left side of his face. Dilatation of ventricles was also more on left side as suggested by MRI findings. Our patient had periorbital skin appendages along with parietal alopecia. Overlying skin on these alopecia regions showed patches of focal dermal hypoplasia. The skin features feature are consistent with the previously described characteristics of OCCS [2].

In our patient, ocular features consisted of a supero -temporal epibulbar dermoid on left side along with upper eyelid coloboma. Other ocular features associated with OCCS like

orbital cysts, microphthamos or anophthalmos were absent.

Affected children may present with psychomotor retardation, seizures, and/ or developmental delay. Literature has also reported of a case with hyperactive deep tendon reflexes throughout as well as a positive Babinski's sign opposite to the side with the ocular findings [6].

The etiology for the same is not known. It has been hypothesized that a sporadic mutation occuring in the fifth or sixth week of development may lead to such condition. It states that it is associated with a somatic mosaicism, which adversely affect the development of the ectodermal structures [7].

Delleman syndrome may have some characteristics which overlaps with other syndromes such as Goldenhar or Goltz syndrome. The former one is also known as oculo-auriculo-vertebral syndrome, which is characterized by a dermoid cyst, auditory and vertebral anomalies. While the latter one presents with microphthalmia, dermal hypoplasia, polysyndactyly and bad dentition [8,9,10]. These syndromes are usually differentiated by the patterns of brain malformations. Those with deformations involving midline and mesencephalon are characteristic of Delleman syndrome [7].

Conclusion

We recommend a detailed neurological workup in all such cases; and if a cerebral or cerebellar abnormality like hydrocephalus is detected as it was present in our case, it necessitates an urgent neurosurgical opinion, to prevent any further damage.

For the effective management, all such children we recommend a combined, closely coordinated approach by the ophthalmologist, the neurosurgeons, the neurophysicians as well as the paediatricians

Conflicts of interest

The authors declares that they do not have conflict of interest.

Funding

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CASE REPORT

Iatrogenic Bladder injury in an appendicular perforation managed conservatively by bladder drainage using a per urethral catheter

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Abstract

Iatrogenic bladder injuries are a cause of morbidity in pelvic surgeries. Bladder perforation could be extraperitoneal or intra-peritoneal. Clinicaly, extraperitoneal bladder perforation is diagnosed by suprapubic pain, extravasation of urine into scrotum, perineum and thighs and difficulty in voiding whereas intraperitoneal bladder injury is diagnosed by signs of lower abdominal pain resembling acute abdomen. The diagnosis of bladder injury is confirmed by Computerised Cystography. The management of extraperitoneal bladder injury is catheter drainage while intraperitoneal bladder injury is managed by open repair. We present a case of Extraperitoneal iatrogenic bladder injury in a patient who underwent exploratory laparotomy for Appendicular perforation.

Keywords: Urinary Bladder injury, Appendicular perforation, Exploratory laparotomy

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Introduction

Iatrogenic bladder injury has an incidence of 0.5-1.0% [1] according to our review of worldwide literature. The incidence and severity of Bladder injury during exploratory laparotomy depends on a number of factors such as presence/ absence of preoperative catheterisation to empty the bladder, indication for the surgery, experience and expertise of the surgeon, identification and careful separation of bladder from the surrounding structures during pelvic surgeries etc. One of the routine steps followed in pelvic surgeries is to identify the bladder by palpating the Foley bulb in the urinary bladder. However, in an emergency setting where the patient is haemodynamically unstable and in the moment of hurry, these steps may not be followed and hence, may lead to inadvertent consequences of iatrogenic Bladder injury. We present a case of appendicular perforation who underwent exploratory laparotomy with inadvertent bladder injury and its successful management using a per urethral foley catheter. A strong clinical suspicion and judgement is usually needed to diagnose and appropriately manage such injuries.

Case report

A 21-year-old male presented to the casualty of a tertiary government hospital with complaints of right iliac fossa pain and fever since 5 days. Patient was primarily evaluated by General surgery department and patient showed signs of systemic inflammatory response syndrome in the form of tachycardia and tachypnoea. The blood pressure was 100/60 mm Hg. On per abdominal examination, patient had guarding and rigidity in the lower abdomen. Patient was then admitted under General surgery department and started on broad spectrum antibiotics in the form of third generation cephalosporins and metronidazole. Routine laboratory investigations revealed leucocytosis with WBC count being 13300/mm^3 and creatinine was 1.0 mg/dl. Patient underwent Xray abdomen erect which showed multiple air fluid levels. He was further evaluated by ultrasound examination of abdomen and pelvis which revealed free fluid in the pelvis. Patient then underwent Computerised tomography of the abdomen and pelvis- Plain and oral + intravenous contrast which revealed appendicolith with pelvic collection suggestive of appendicular perforation (Figure 1).

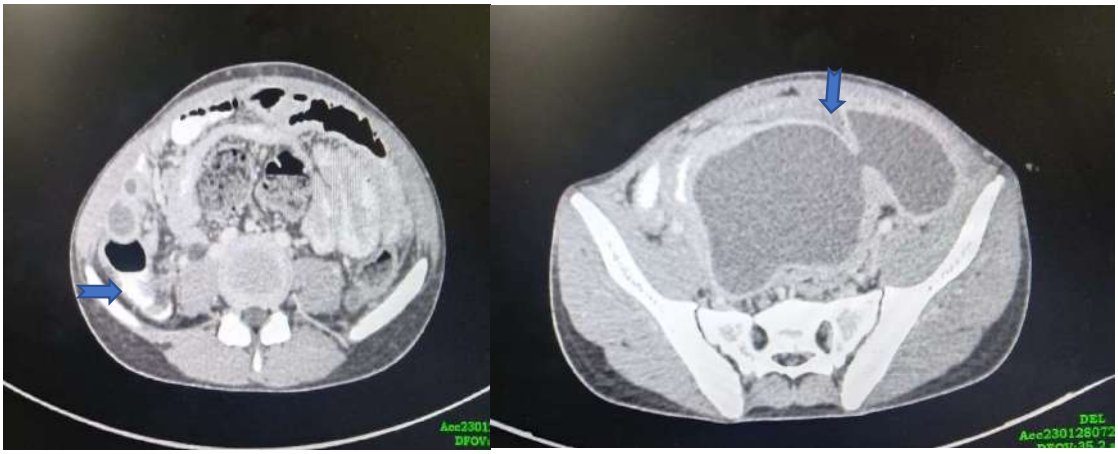

Figure 1a and 1b. CECT abdomen and pelvis suggestive of appendicular perforation with pelvic collection.

Patient then underwent Exploratory Laparotomy through a lower midline vertical incision. Intraoperative findings were suggestive of generalised free fluid in the peritoneal cavity with pus flakes and an appendicular lump. In view of appendicular lump, decision was made to give a peritoneal wash and put two drains; one in the right iliac fossa and one in the pelvis. Postoperatively, patient gradually improved. Both the drains had an output of 40 ml each on first 3 days; serosanguinous in nature. Right iliac fossa drain was removed on post-operative day 3. Per urethral foley catheter was removed on POD3. Patient was adequately mobilised from post-operative day 4 which resulted in increase in drain output to 1100ml on post-operative day-4 which was serous in nature. Post catheter removal, patient voided well for one day but however, on post-operative day-5, patient was not able to pass urine per urethraly and started developing profuse soakage of midline wound with serous fluid. On examination of the wound, there was no evidence of burst abdomen or wound dehiscence. Finally, Foley catheter was re-inserted per urethraly and methylene blue was flushed through it. This resulted in methylene blue leaking from the midline wound but no methylene blue in the pelvic drain. A urology consult was obtained and patient was advised Computerised Tomography Cystography. CT cystography revealed evidence of urinary bladder perforation -about 1.5 cm rent in the dome of the bladder and the extravasated contrast was seen tracking through a linear tract of length 4.4 cm tracking anterior and opening into skin surface near the central surgical scar site. There was no evidence suggestive of contrast extravasating into the peritoneal cavity. These findings were suggestive of extraperitoneal bladder perforation (Figure 2).

Figure 2. CT Cystography showing extra-peritoneal rupture of dome of the urinary bladder with a fistulous tract communicating to anterior abdominal wall skin near the midline surgical scar.

The patient was managed by continuous bladder drainage using a 14 F Foley catheter per-urethraly. After 3 weeks, review CT cystography showed healed bladder peroration and the catheter was removed and patient recovered successfully (Figure 3).

Figure 3. CT cystogram after 3 weeks shows complete healed bladder perforation.

Discussion

Iatrogenic bladder injuries increase significant morbidity for the patient. Hence, preventive measures should be undertaken to prevent such a occurrence. Strong Clinical suspicion is usually required to diagnose it in the early period. The literature review results lead to several important conclusions. First, the problem of iatrogenic injuries is well studied and analyzed. There is a set of preventive measures aimed at reducing the risk of injury. However, all these measures do not exclude urinary system injuries. The human factor, the difficult surgical situation, the imperfection of the technical aspects partially offset the preventive effect. Second, there is a lack of mandatory examination algorithms for the group of patients at risk. Thus, there is a significant problem of the urinary tract iatrogenic injuries, so far not completely resolved [2,3]. Third, patients set to undergo exploratory laparotomy through lower midline vertical incisions especially should have pre-operative bladder catheterisation perurethraly to drain the bladder, identification of the foley bulb in the bladder and careful separation of the bladder, vigilance during surgery to identify and repair iatrogenic bladder injuries etc. would help to decrease the incidence of bladder injuries and its associated morbidity [4,5]. Our case report shows that how this case was diagnosed relatively early and managed appropriately by catheter drainage.

Conclusion

This case report shows that during abdominal surgeries, care must be taken to avoid iatrogenic bladder injuries and in case of untoward consequences, how the injuries should be managed.

Conflicts of interest

The authors declares that they do not have conflict of interest.

Funding

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CASE REPORT

Horseshoe kidney with a gigantic Calculus: A documented case report

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Abstract:

The most frequent genitourinary fusion abnormality described in literature is horseshoe kidney. Horseshoe kidney because of its abnormal anatomy is linked to malrotations, fluctuating blood flow, high insertion of the ureter, a tendency to develop ureteropelvic junction (PUJ) obstruction in up to one-third of patients, and these are all presentations of this condition. One-third of the patients with horseshoe kidney present with either stone disease or PUJ obstruction. In our case report, we discuss the treatment of a 38-year-old male patient who had been complaining of abdominal pain for the past few years, was found to have a horseshoe kidney and presented to us in urosepsis due to gigantic large calculus in right segment of horseshoe kidney and acute renal failure which was managed initially on emergent basis by insertion of percutaneous nephrostomy tube into the right segment followed by 2 months later by open right sided nephropyelolithotomy. The patient was relieved of all his symptoms at 3rd month follow-up and resumed his daily activities.

Keywords: Horseshoe kidney, urolithiasis, nephropyelolithotomy, renal calculi

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Introduction

The most common genitourinary fusion anomaly is horseshoe kidney, occurring 1/400-1/800 times per 100,000 people [1,2]. Up to one-third of patients had malrotation, variable blood flow, and a tendency for ureteropelvic junction obstruction (PUJ) [3]. The cause of PUJ obstruction is considered to be caused by congenital strictures, a high ureteric insertion, an irregular ureteral course, crossing vessels feeding the isthmus, or an aberrant motility of the PUJ segment [4]. The etiology of stone formation was formerly assumed to be caused by an elevated rate of infection, stasis, and PUJ obstruction. However, now it has been evaluated and found that these patients have metabolic causes [5]. Usually a horseshoe kidney has no symptoms. Whenever the urinary flow is obstructed, signs and symptoms of stone and obstruction become apparent. Here we describe the case of a 38-years-old male patient who presented with abdominal pain and was diagnosed with horseshoe kidney with gigantic calculi in the right segment of the horseshoe kidney.

Case presentation

A 38-year-old male had complaints of right sided lower abdominal pain over a period of last 2 years months on and off. He presented to the urology outpatient department with complaints of high-grade fever and right sided abdominal pain associated with dysuria. He was admitted and blood was drawn for complete blood count, renal function tests and urine and blood -culture and sensitivity. The lab results were raised wbc counts of 21000/mm3 and creatinine of 1.2. He was also advised a XRAY KUB (Kidney ureter and bladder) (Figure 1) and ultrasound of abdomen and pelvis (Figure 2) which revealed grossly dilated right kidney with gross hydronephrosis with features suggestive of pyonephrosis with pelvi-ureteric junction obstruction with a gigantic calculus of size 8.5 cm in the right renal pelvis of the right segment of the horseshoe kidney.

Figure 1. Xray KUB shows large gigantic staghorn stone in the right segment of the horseshoe kidney.

Figure 2. Ultrasound KUB shows right sided gigantic calculus with gross hydronephrosis in horseshoe kidney.

Then the patient underwent Computerised topography Urography which revealed horseshoe shaped kidney with fusion of lower poles at level of L3 vertebra. There was evidence of large staghorn calculus measuring 9.3 *8.3 cm in the right renal pelvis of the right segment of the horseshoe kidney associated with moderate to gross dilatation of the right pelvicalyceal system with significant thinning of the right renal cortex with average cortical thickness being 5 mm. On 10 minutes delayed films, the right kidney showed excretion of contrast. The left segment was normally functioning. (Figures 3-5).

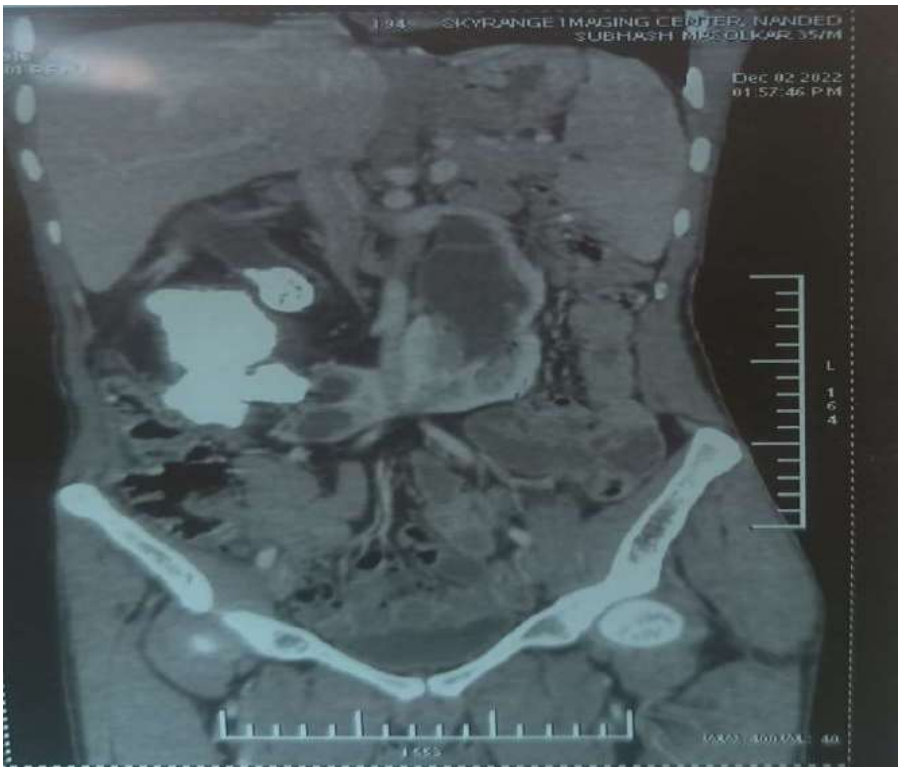

Figure 3. Coronal section film of CT urography showing horseshoe kidney with large gigantic right sided calculus.

Figure 4. Axial section film of CT urography shows large right sided calculus with hydronephrosis in horseshoe kidney.

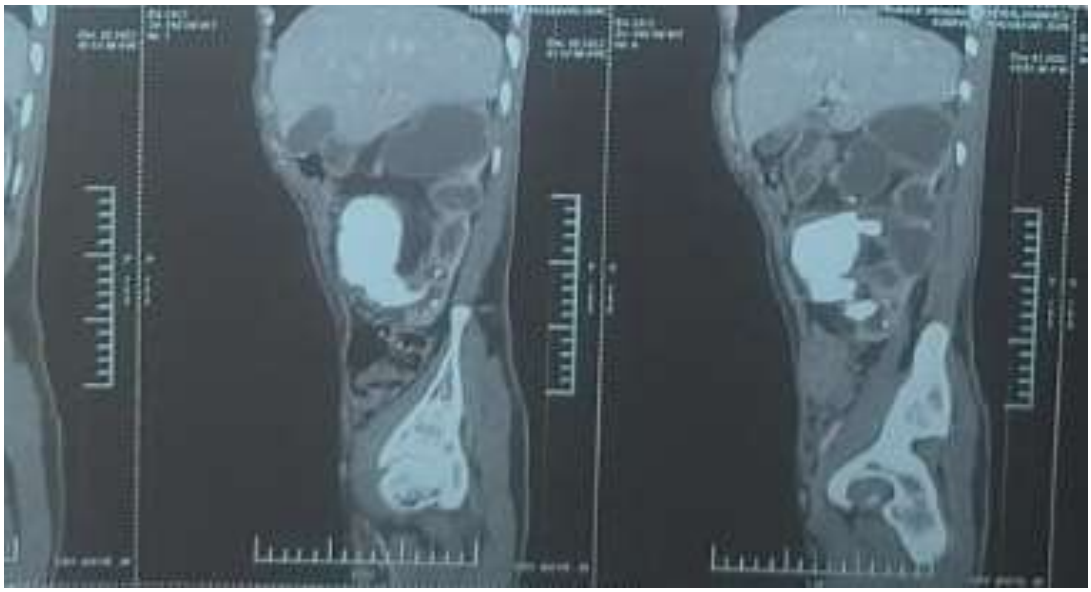

Figure 5. Sagittal section films of CT urography showing the Right aided gigantic calculus with gross hydronephrosis of the right kidney.

Hence, the patient underwent ultrasound guided percutaneous nephrostomy (PCN) insertion on the right side to drain the pus. He was managed with i.v. antibiotics and hydration. He was managed with PCN in situ to allow the infection to settle for a period of 2 months. Over the course of 2 months, the average daily PCN output was 200-250 ml. Patient then underwent nuclear study-DTPA scan to study the differential function. DTPA scan showed left kidney with delayed cortical uptake with normal excretory phase with GFR of 39.9 ml/min and a differential function of 62.7 %. Right kidney showed obstructive pattern with Type 2 O'Reilly curve pattern with GFR of 23.8 ml/min and differential function of 37.3% (Figure 6).

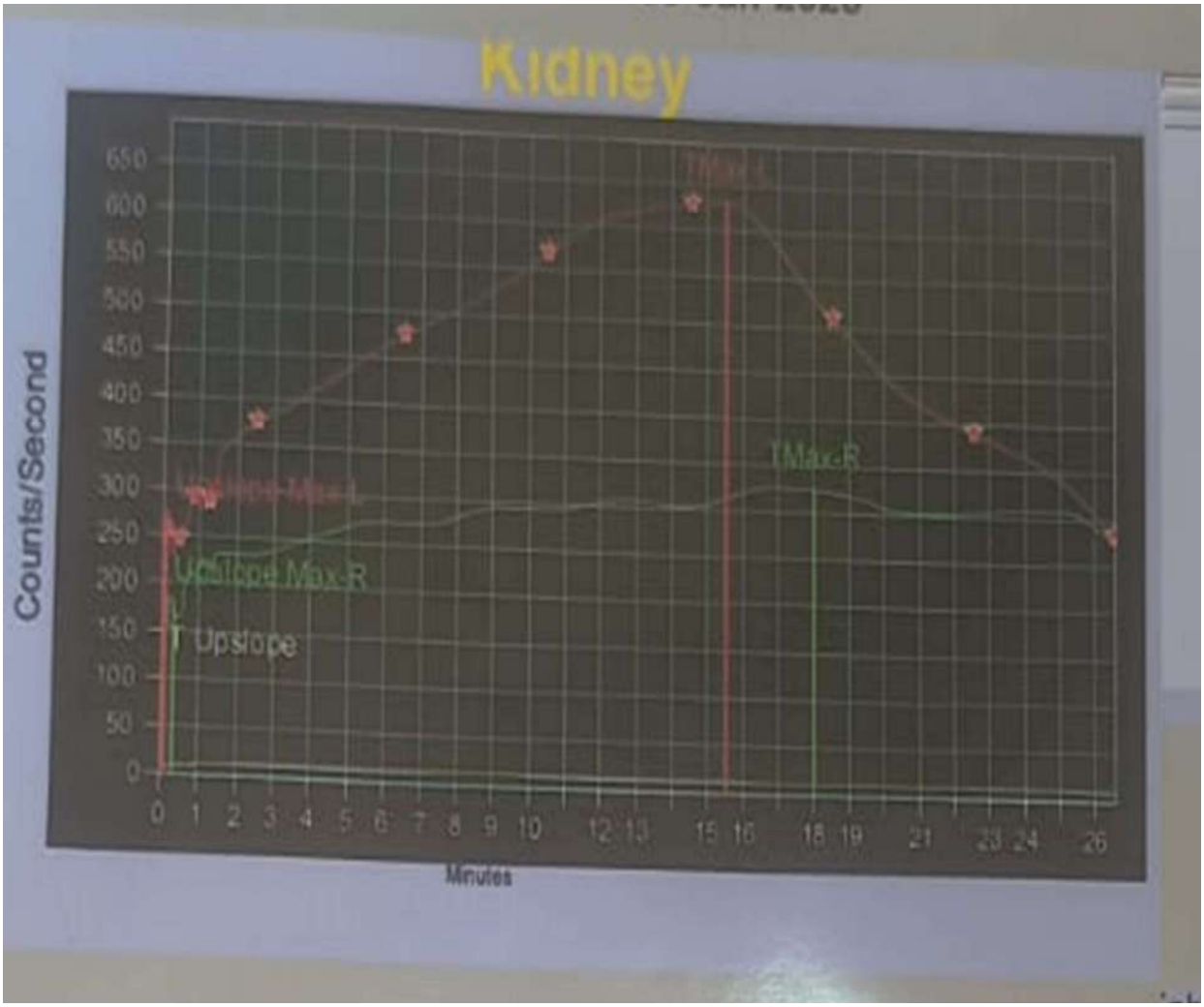

Figure 6. DTPA renogram showing type 2 O'Reilly curve pattern of obstruction of the right kidney with normal function of the left kidney.

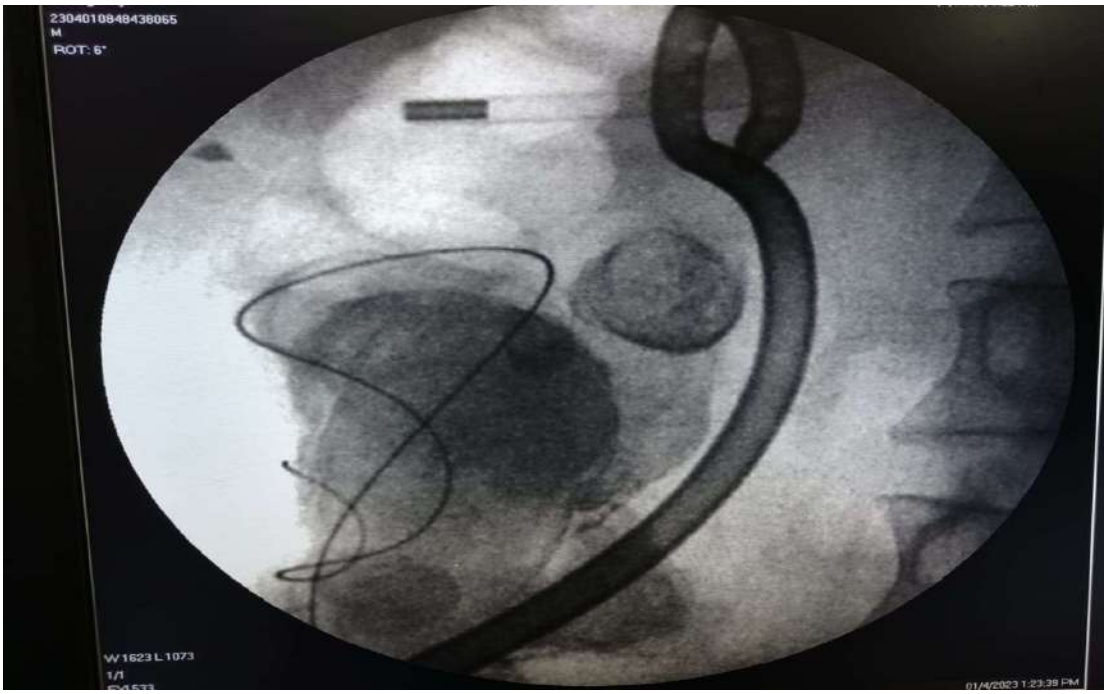

Figure 7. Scout film showing the large right sided gigantic calculus with PCN tube in situ. Preoperatively, right sided DJ stent was done to aid in identification of the right ureter during the surgery. In the image, we can see the placement of the terumo guidewire in the right sided pelvis over which the DJ stent was placed.

Figure 8. Intraoperative image showing the horseshoe kidney with the forceps pointed at the isthmus.

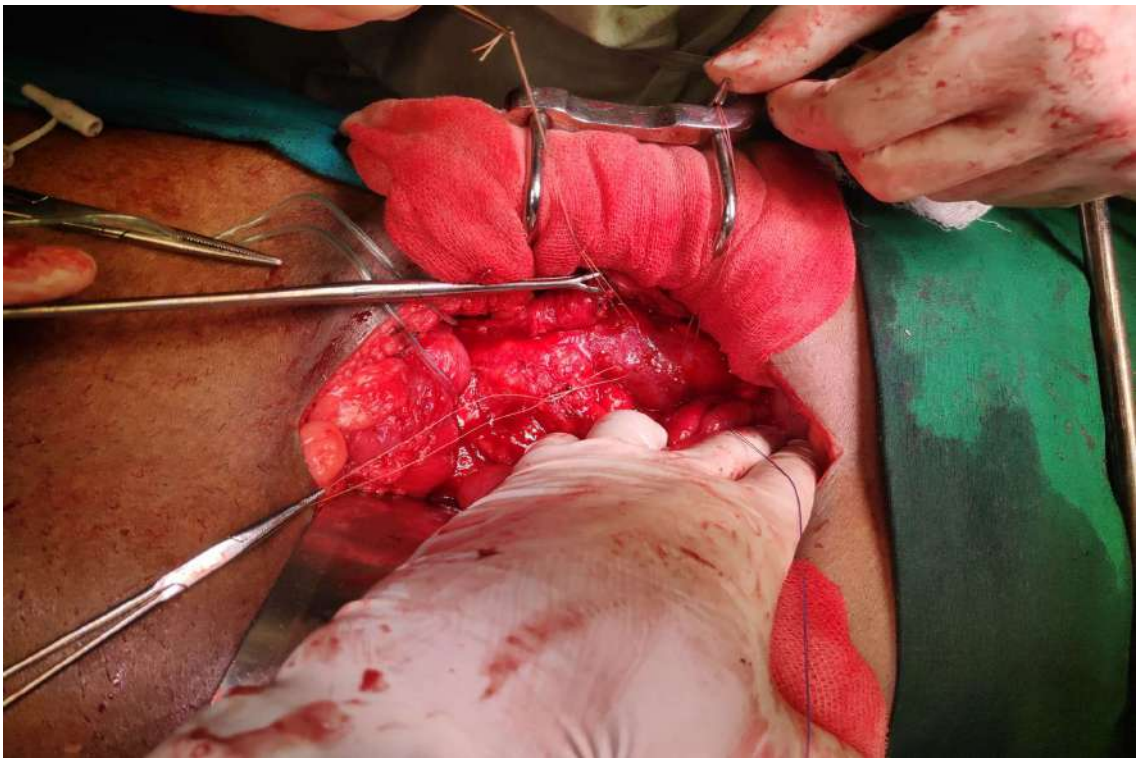

Figure 9. Intraoperative image showing the right sided renal pelvis with stay sutures taken on either side of the planned longitudinal pyelolithotomy incision.

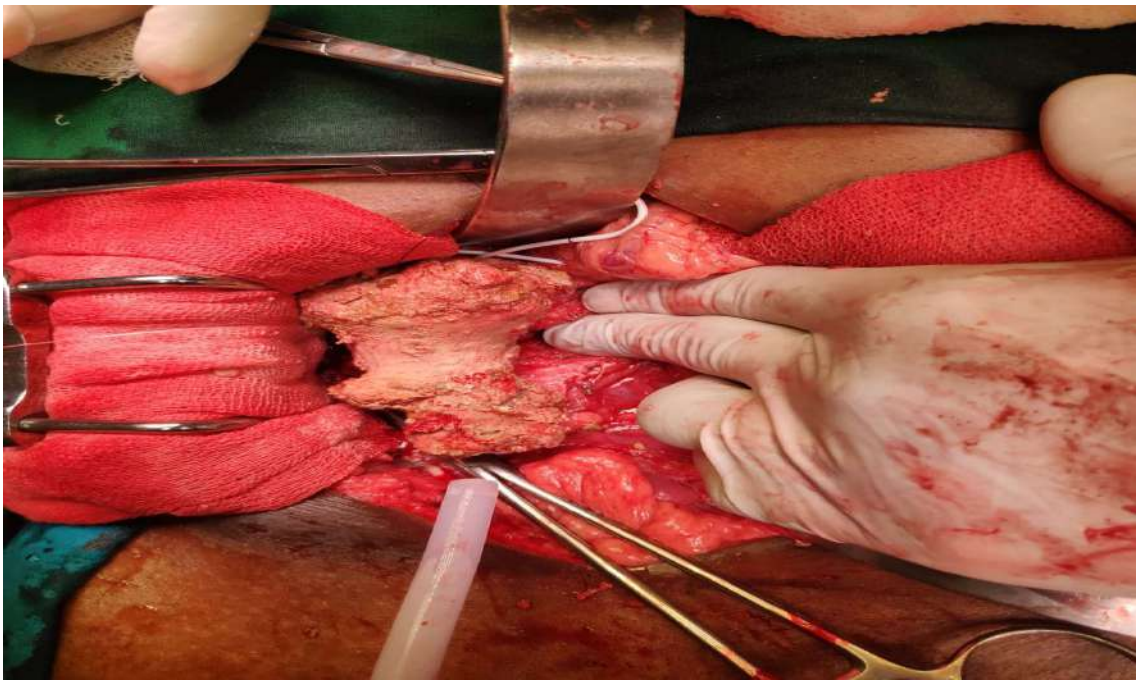

Figure 10. Intraoperative image showing the largest right sided calculus after pyelolithotomy incision.

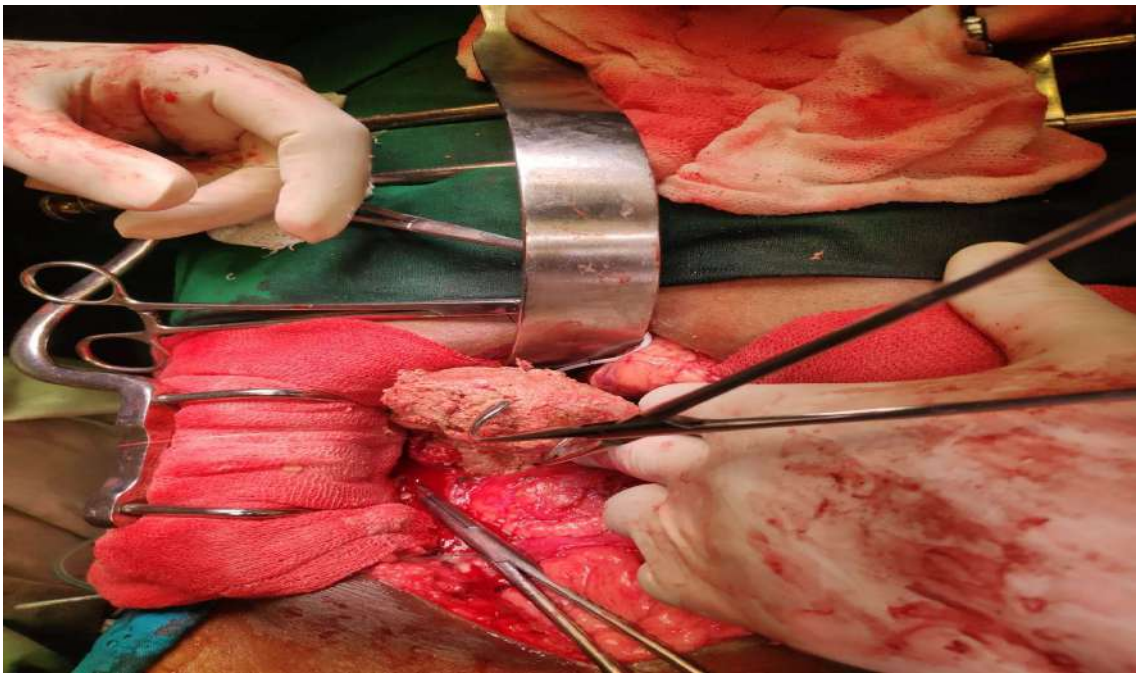

Figure 11. Intraoperative image showing the large calculus being extracted using Desjardin's pyelolithotomy forceps.

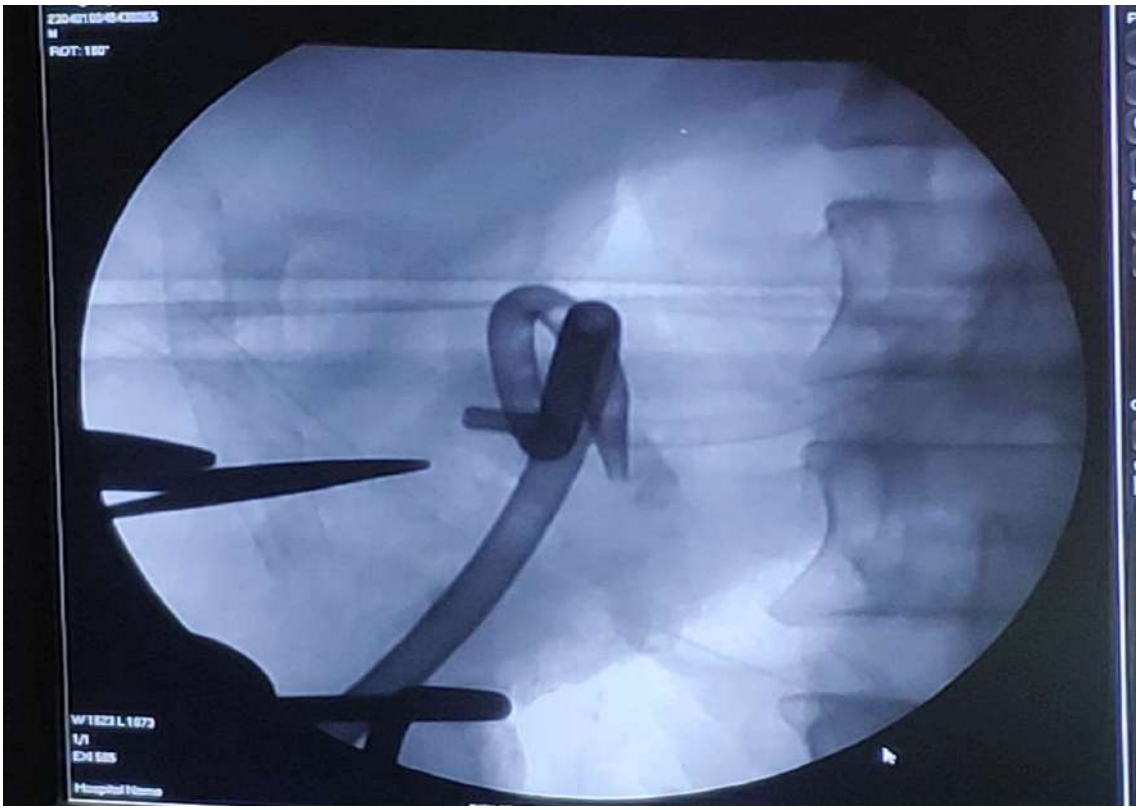

Figure 12. Intraoperative C-Arm Image showing complete stone clearance on the right side.

Figure 13. Postoperative image of the Large gigantic calculus along with other secondary calculi.

So, finally decision was made to go ahead with open right sided pyelolithotomy with pyeloplasty. Preoperatively, right sided 6/24 DJ stenting done to aid in identification of the right ureter during open surgery. (Figure 7). Open surgery was done using a midline vertical abdominal incision. The right segment of the horseshoe kidney was visualised after adequate mobilisation and reflection of the right sided colon. A longitudinal incision was made for the pyelolithotomy and the gigantic calculus was removed along with all other secondary calculi and then pyelolithotomy was closed using vicryl round bodies 3-0 with placement of 6/24 F DJ stent (Figures 8-13). An abdominal drain was placed and incision was closed. The patient underwent DJ stent removal after 6 weeks. A repeat DTPA scan after 3 months after surgery showed good excretion of the right segment of the horseshoe kidney.

Discussion

Horseshoe kidneys and its associated abnormalities present unique challenges to the urologist in their clinical practice. One-third of individuals with horseshoe kidney are aymptomatic, and it is only seldom found by incidental imaging findings. During the embryologic development, the inferior poles of the kidney fuse as it grows and hence, the kidney does not ascent as the inferior mesenteric artery obstructs. Infection, calculi, blockage or tumour owing to an abnormal pelvic posture, and ureters are all clinical findings. For a practising urologist, in terms of therapeutic decision-making and technical factors, horseshoe kidneys present a unique challenge. Retrograde intrarenal surgery (RIRS) could be employed as a option for small and medium sized calculi. In our case report, there was a gigantic calculus and multiple other large calculi so, open pyelolithotomy was chosen as the treatment plan. The patient was effectively managed with right-sided open pyelolithotomy. He had complete stone clearance in single surgery and is now on regular follow-up.

Conclusion

For a urologist, horseshoe kidney presents unique challenges in diagnosis and technical challenges in management. In

case of a horseshoe kidney with numerous renal calculi, consider and suspect PUJ obstruction and treat it to prevent recurrence of calculi. We believe that open surgery still has a place in the treatment of renal calculi in these patients inspite of availability of minimally invasive techniques due to the sheer complexity of the anomalies. Thus, to conclude it is important to understand that in those with abnormal anatomy, open surgery is a safe technique to deal with them.

Conflicts of interest

The authors declares that they do not have conflict of interest.

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