Volume 9, Issue 8, August – 2024 International Journal of Innovative Science and Research Technology
ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24AUG571

Eventration of Right Hemidiaphrgm – A Post Covid -19 Infection Complication

Dr. J. G. Bhatt[1]
Hod and Professor
Department of General Surgery.

Dr. J. G. Vagadia[2]
Associate Professor
Department of General Surgery.

Dr. Manisha Nakum[3]
Junior Resident,
Department of General Surgery.

Dr. Naresh Kumar[4]
Junior Resident,
Department of General Surgery.

Dr. Komal Kalariya[5]
Senior Resident,
Department of General Surgery.
Pandit Dindayal Upadhyay Medical College and Civil Hospital ,
Rajkot, Gujarat

Abstract:-

- ***Introduction and Significance:***

Diaphragmatic eventration is an uncommon disorder marked by partial or complete thinning of the diaphragm's muscle tissue. In this condition, the diaphragm, which is normally flexible and moves downward during inhalation, instead moves upward in a paradoxical manner. This abnormal movement leads to restricted lung function. The condition can be congenital or acquired, with acquired cases often resulting from trauma to the phrenic nerve, either from mechanical or surgical causes, compression by thoracic space-occupying lesions, or various infectious or inflammatory conditions impacting the phrenic nerve. Many individuals with this condition may remain asymptomatic for long periods, leading to frequent underdiagnosis. Clinical suspicion should prompt chest X-rays, and the diagnosis can be confirmed with chest computed tomography (CT).

- ***Case Presentation:***

We report the case of a 65-year-old male who exhibited right-sided hemi-diaphragmatic eventration and experienced dyspnea over the past two years. The patient underwent a multilayer surgical plication of the right hemidiaphragm, which resulted in a successful outcome.

- ***Clinical Discussion:***

The choice to proceed with surgical intervention for diaphragmatic eventration is influenced by the severity of associated complications. Patients who are symptomatic and exhibit compromised respiratory, cardiovascular, or gastrointestinal function generally require diaphragmatic plication.

- ***Conclusion:***

Despite its rarity, diaphragmatic eventration is a condition that warrants careful evaluation by clinicians. Early detection and surgical intervention are key to managing and repairing this condition effectively.

Keywords:- *Dyspnea Diaphragmatic Eventration Plication Covid-19 Infection.*

I. INTRODUCTION

Diaphragmatic eventration is characterized by an abnormal upward displacement of the diaphragm, which can arise from either congenital or acquired causes. The condition has a prevalence of approximately 0.05%, with a higher incidence in males[1]. It can affect the entire diaphragm or just a portion of one hemidiaphragm, with the left side being more frequently involved[2]. While congenital diaphragmatic eventration in adults is rare, it is often asymptomatic and typically does not necessitate intervention[3]. In contrast, acquired eventration is usually attributed to injury of the phrenic nerve, leading to muscular atrophy and the subsequent upward displacement of the diaphragm. The patient described in this case had a history of COVID-19 infection, which was followed by eventration of the right hemidiaphragm[4] . Diagnosis is generally based on the patient's history, clinical evaluation, and imaging modalities such as Chest X-ray, computed tomography (CT), ultrasonography (USG), or Magnetic Resonance Imaging (MRI). In some cases, diagnostic laparoscopy may be required for confirmation[3]. Diaphragmatic plication, a well-established and safe procedure, can be performed via thoracic or abdominal approaches[5]. This report follows the SCARE criteria[6].

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24AUG571

II. CASE REPORT

A 65-year-old male presented with persistent dyspnea that had been ongoing for the past two years. He denied experiencing any abdominal swelling, pain, or bloating. Physical examination revealed reduced chest expansion on the right side, with auscultation showing decreased breath sounds in the same area. The abdominal examination was unremarkable, with the abdomen being soft and non-tender.

Following the general examination, a chest X-ray was performed, which showed an elevated right hemidiaphragm (Fig. 1). High-resolution computed tomography (HRCT) of the chest confirmed the elevated right hemidiaphragm, along with thinning and upward displacement of the liver, indicative of diaphragmatic eventration (Fig. 2). HRCT also revealed thin reticular opacities in both lungs, most pronounced in the lower lobes, suggesting sequelae of a prior atypical viral infection. Blood tests, liver function tests, and renal function tests were all within normal limits, and serology results were non-reactive.

The diagnosis of right hemidiaphragmatic eventration was confirmed, and surgical correction was deemed necessary. A laparotomy was performed, and the right hemidiaphragm was plicated with mesh augmentation.

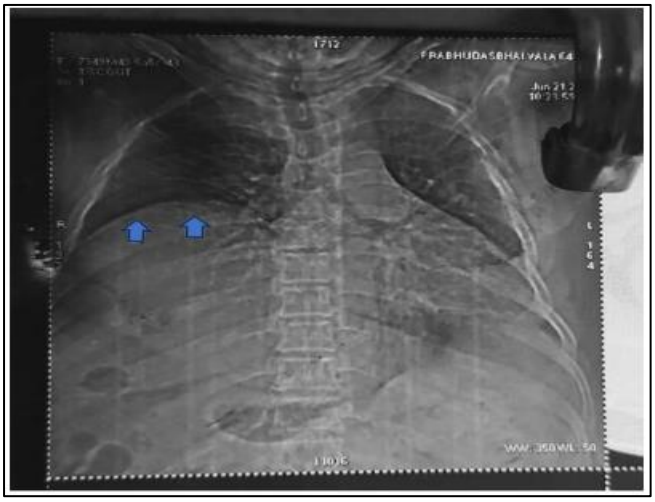

Fig. 1 Chest X-Ray showing Elevated Right Hemidiaphragm

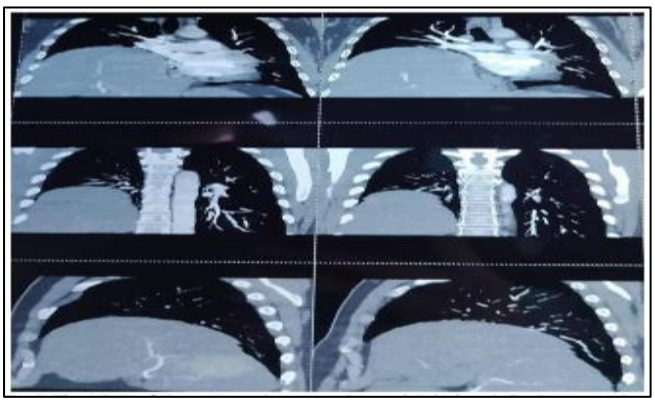

Fig 2 The HRCT of the Patient shows an Elevated Right Hemi-Diaphragm with an Upward Displacement of the Liver, Indicative of Eventration.

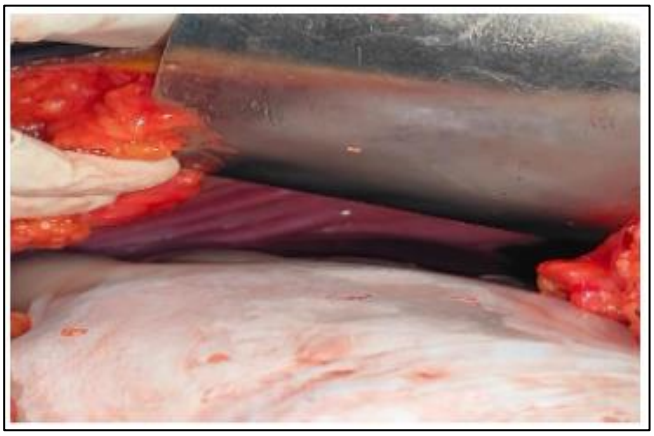

Fig 3 Lax Diaphragm with No Adhesions

The surgical layers were approached sequentially, beginning from the lateral aspect and progressing medially, then from anterior to posterior. Following this, percutaneous dynamic stabilization (PDS) was carried out using a 10×15 cm² Proceed mesh for meshplasty. A 32 Fr abdominal drain was inserted and was removed on postoperative day 4, adhering to aseptic protocols.

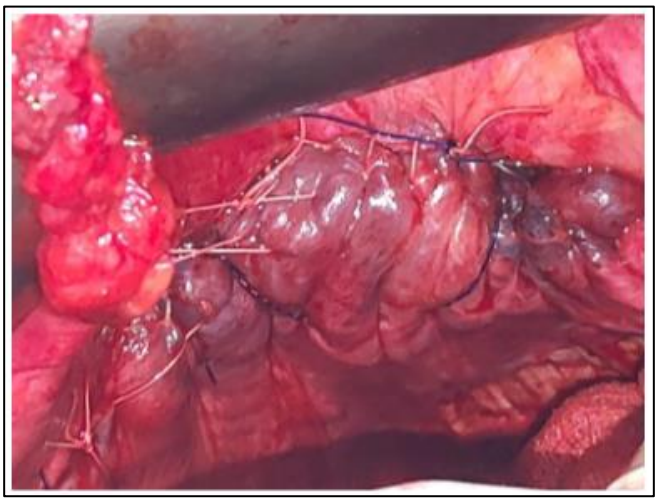

Fig 4 Three-Layer Plication of an Eventrated Diaphragm Performed.

Fig 5 Meshplaty using 10× 15 cm2 Proceed Mesh

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24AUG571

Diaphragmatic plication enhances respiratory function by increasing both tidal volume and maximum respiratory capacity[10][12]. research by tiryaki et al, demonstrated that diaphragm positioning normalized in fourteen of fifteen patients following plication[1]. additionally , a case series revealed sustained improvements in dyspnea scores , patient satisfaction and PFT after using an open transthoracic approach[17].

In the case of our patient, who experienced dyspnea significantly impacting daily activities and was limited to walking less than 1 kilometer, we chose to perform a right exploratory laparotomy with multilayer diaphragmatic plication. Postoperative relief was achieved, and a six-month follow-up confirmed complete resolution of symptoms. Video-assisted thoracoscopic surgery (VATS), a newer and minimally invasive technique, is also a viable option for diaphragmatic plication[18]. However, VATS has yet to be extensively validated in larger populations and warrants further investigation[18].

While many individuals with diaphragmatic eventration may remain asymptomatic for long periods, prompt surgical intervention in symptomatic cases can lead to substantial symptom relief and an enhanced quality of life.

Fig 6 Chest X-Ray taken on the First Postoperative Day Demonstrating the Resolution of the Previously Elevated Diaphragm.

III. DISCUSSION

Diaphragmatic eventration can occur unilaterally or bilaterally. Right-sided eventration is less frequent, likely due to the faster closure of the right pleuroperitoneal hiatus and the protective role of the liver over the right diaphragm[7][8]. Moreover, 88–97% of cases of hemi-diaphragm agenesis affect the left side[7][8]. The average age for diaphragmatic eventration in adults is 41.86 years, with a higher incidence in males[9]. In contrast, our patient is a 65-year-old male with involvement of the right hemidiaphragm.

While many patients with diaphragmatic eventration remain asymptomatic for long periods, those who are symptomatic often experience chest pain, dyspnea, orthopnea, or recurrent pneumonia[10][11]. They may also present with vague gastrointestinal symptoms such as nausea, belching, dyspepsia, and epigastric discomfort[12]. Diaphragmatic eventration is typically considered only after other potential causes have been excluded[13]. According to Lau GT et al., diaphragmatic eventration can impair respiratory function due to reduced diaphragmatic contraction[14]. In our case, the high dome of the diaphragm might have contributed to pulmonary collapse, worsening the infectious condition. The patient's history of COVID-19 infection two years prior, during which he was hospitalized for over a month, may account for his symptoms of dyspnea and coughing.

Chest radiography is the primary diagnostic tool for identifying diaphragmatic eventration or hernia[15]. In eventration, the continuous contour of the diaphragm helps distinguish it from diaphragmatic hernia[16]. The initial chest X-ray revealed an elevated right hemidiaphragm and upward displacement of the live. Follow-up high-resolution computed tomography (HRCT) confirmed the diagnosis of right-sided diaphragmatic eventration[1][8], which is less common than left-sided cases. The precise cause of the eventration remains unclear, as there is no history of trauma, nerve injury, or notable congenital anomalies. Surgical intervention is generally reserved for symptomatic patients[10]. Techniques for diaphragmatic plication include open thoracotomy, video-assisted thoracoscopic surgery (VATS), laparoscopic surgery, and robotic-assisted surgery[2][10].

IV. CONCLUSION

Patients presenting with dyspnea and a history of febrile illness should be assessed for diaphragmatic eventration. Surgical intervention, specifically diaphragmatic plication, should be considered to prevent further decline in lung function. The chest X-ray demonstrated sufficient inflation of the right lung and flattening of the right hemidiaphragm

- *Registration of Research Studies : N/A.*
- *Author Contribution*

- Dr. manisha

- *Guarantor*

- Dr. Jatin Bhatt HOD and Proffesor
- Department of general surgery Pdu medical College Rajkot

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24AUG571

REFERENCES

[1]. Tiryaki T, Livanelioglu Z, Atayurt H. Eventration of the diaphragm. Asian J Surg˘ 2006;29:8–10.
[2]. Visouli AN, Mpakas A, Zarogoulidis P, et al. Video assisted thoracoscopic plication of the left hemidiaphragm in symptomatic eventration in adulthood. J Thorac Dis 2012;4(Suppl 1):6– 16.
[3]. Mantoo SK, Mak K. Congenital diaphragmatic eventration in an adult: a diagnostic dilemma. Singap Med J 2007;48:e136–7.
[4]. Olusoji OO, Thomas MO, Ogunleye EO, et al. Eventration of the diaphragm-case reports and review of the literature. Niger Q J Hosp Med 2013;23:142–4.
[5]. Pathak S, Page RD. Splenic injury following diaphragmatic plication: an avoidable life- threatening complication. Interact Cardiovasc Thorac Surg 2009;9:1045–6.
[6]. Agha RA, Franchi T, Sohrabi C, et al. The SCARE 2020 guideline: updating consensus surgical CAse REport (SCARE) guidelines. Int J Surg 2020;84:226–30.
[7]. Wenzel-Smith G. Posterolateral diaphragmatic hernia with small-bowel incarceration in an adult. S Afr J Surg 2013;51:73–4.
[8]. Stolar CJH, Dillon PW. Congenital Diaphragmatic Hernia. reference 〉 referencespapershttps://www.scirp.org.1998. reference 〉 referencespapers, htt ps://www.scirp.org. https://www.scirp.org/%28S%28lz5mqp453edsnp55rrgjct55%29%29/reference/referencespapers.aspx?referenceid=1867653.
[9]. Ali Shah SZ, Khan SA, Bilal A, et al. Eventration of diaphragm in adults: eleven years experience. J Ayub Med Coll Abbottabad 2014;26:459–62.
[10]. Groth SS, Andrade RS. Diaphragm plication for eventration or paralysis: a review of the literature. Ann Thorac Surg 2010;89:S2146–50.
[11]. Mouroux J, Venissac N, Leo F, et al. Surgical treatment of diaphragmatic eventration using video-assisted thoracic surgery: a prospective study. Ann Thorac Surg 2005;79:308–12.
[12]. Groth SS, Andrade RS. Diaphragmatic eventration. Thorac Surg Clin 2009;19: 511–9.
[13]. Ribet M, Linder JL. Plication of the diaphragm for unilateral eventration or paralysis. Eur J Cardio Thorac Surg 1992;6:357–60.
[14]. Lau GTE, To ACY. Eventration of the right hemidiaphragm with resultant right atrial compression-A rare finding. Echocardiography 2016;33:1432–3.
[15]. Midrio P, Gobbi D, Baldo V, et al. Right congenital diaphragmatic hernia: an 18- year experience. J Pediatr Surg 2007;42:517–21.
[16]. Shen C, Che G. Congenital eventration of hemidiaphragm in an adult. Ann Thorac Surg 2012;94:e137–9.
[17]. Higgs SM, Hussain A, Jackson M, et al. Long term results of diaphragmatic plication for unilateral diaphragm paralysis. Eur J Cardio Thorac Surg 2002;21: 294–7.
[18]. Taberham RJ, Raza A, Alzetani A, et al. VATS plication of the diaphragm: a descriptive observational 10-year southampton experience. Innovations 2017;12: 398–405.