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Managing Catamenial Pneumothorax: Challenges of Diagnosis and Therapy, Literature Review

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Abstract
Catamenial pneumothorax (CP) is a rare and recurrent spontaneous pneumothorax in women, typically occurring from 24 hours before menstruation to 72 hours afterward. While once considered uncommon, CP is now recognized in up to 30% of pneumothorax cases among women. This study aims to provide a comprehensive literature-based analysis of the etiology, diagnosis, and multidisciplinary management of CP. The research method used is a literature review that analyzes clinical cases, diagnostic imaging, histopathological findings, and treatment outcomes from various databases and published case reports. Findings suggest that while the etiology remains multifactorial—including diaphragmatic defects, lymphovascular dissemination, and hormonal influences—the use of video-assisted thoracic surgery (VATS) combined with pleurodesis and postoperative hormonal therapy (e.g., GnRH analogs) significantly reduces recurrence rates, down to 0% in some combined therapy cases. Imaging modalities like MRI during menstruation increase diagnostic accuracy. The study also underscores the importance of surgical timing, hormonal therapy continuity, and long-term monitoring for recurrence prevention. Implications of this study include the need for standardized treatment protocols and the incorporation of gynecological and thoracic collaboration in managing CP. Future research should explore biomarkers and prospective multicenter trials to refine diagnostic and therapeutic strategies.

INTRODUCTION

Pneumothorax is a condition that can cause emergencies in the respiratory system. Catamenial pneumothorax is included in a medical condition called *thoracic endometriosis syndrome* (TES), TES is a collection of symptoms in the form of endometriosis lesions in the lung and pleural tissues accompanied by several clinical manifestations, namely catamenial pneumothorax, catamenial hemoptysis or nodules in the lungs (Ciriaco et al., 2022).

Endometriosis is a benign gynecological disease that affects almost 10% of women of childbearing age. The endometrial glands and stroma that are outside the uterus are usually found inside the pelvic cavity, although rarely, the disease can extend to extra-pelvic areas such as the lungs and pleura. Catamenial pneumothorax is defined as recurrent spontaneous pneumothorax that occurs between 24 hours before and 72 hours after the onset of menstruation. The disease has always been considered an unusual condition, but as the disease becomes more easily recognized, its frequency is currently reported at 23-30% of all pneumothorax in women (Ciriaco et al., 2022; Miedziarek & Kasprzyk, 2022).

The mechanism of occurrence of thoracic endometriosis is not yet fully understood. A number of theories have been put forward including metaplasia of eendometrial stromal cells, whose spread can be through the lymphatic or hematogenous tracts, with *retrograde menstruation* followed by migration of endometrial cells through the transdiaphragm. Other

theories assume the role of endometrial tissue or the coexistence of endometriosis as a key factor in the development of the disease (Gil & Tulandi, 2020).

Catamenial pneumothorax is characterized by shortness of breath, or chest or shoulder pain that occurs 24 hours before up to 72 hours after menstruation begins. A study conducted by Gil *et al*, stated that diaphragmatic lesions were found in about 89% of cases with pelvic endometriosis from laparoscopic examination. Confirmation of histopathological examinations showing a positive result for endometriosis ranges from 39% to 87.5%. Endometriosis specimens taken at the base of the lungs are usually more numerous than specimens from the apex part of the lungs (Gil & Tulandi, 2020; Kaya et al., 2020).

Thoracic X-rays are the first imaging examination for the diagnosis of pneumothorax. Catamenial pneumothoracic associated with thoracic endometriosis or diaphragm penetration and *computerized tomography* (CT) or *magnetic resonance imaging* (MRI) can show a small diaphragmatic defect called an "air-filled bubble" perforation. The best standard diagnostic and treatment tool for catamenial pneumonia is *video-assisted thoracic surgery* (VATS), which allows for a variety of treatment modalities depending on the characteristics of the lesion identified (Aboujaoude et al., 2020; Quercia et al., 2023).

Catamenial pneumothorax with mild symptoms is usually treated with rest or observation and thoracocentesis or *chest tube* to relieve symptoms. Most surgical treatments are performed by thoracoscopy and pleurodesis is recommended to reduce recurrence. A blebectomy or pleurectomy of the apical slice may also be performed. Surgery is usually performed when conservative treatment fails or in women who have recurrent or recurring recurrences (Gil & Tulandi, 2020).

The diagnosis of catamenial pneumothorax is still difficult and often delayed, this should be suspected in all women of reproductive age who experience symptoms of pneumothorax that become more severe during menstruation (Nizami et al., 2019). Catamenial pneumothorax is a rare case and occurs when the condition is specific to women, this makes the author interested in discussing the diagnosis and management of catamenial pneumothorax based on the literature and case reports of catamenial pneumothorax which is expected to be a guide in the treatment of patients in the future.

This study aims to provide a comprehensive literature-based analysis of the etiology, diagnosis, and multidisciplinary management of CP. The current study provides a comprehensive integrative literature review on catamenial pneumothorax (CP), emphasizing the diagnostic complexity, pathophysiological theories, and multidisciplinary management including surgical and hormonal therapy. In contrast to previous works such as Gil & Tulandi (2020), which primarily focused on VATS as a diagnostic and therapeutic approach, and Pathak et al. (2019), which analyzed recurrence rates among different treatment modalities, this study extends the discussion by highlighting the role of advanced imaging—particularly MRI during menstruation—for improved detection of lesions (Celik & Erşen, 2019), proposing future multicenter studies and biomarker-based diagnostics, and presenting a layered therapy framework involving surgery, pleurodesis, and hormonal therapy aimed at minimizing recurrence. The novelty of this research lies in its multimodal and prevention-focused orientation, offering a synthesized approach across disciplines and suggesting practical, long-term clinical pathways while also linking thoracic endometriosis with gynecological pathology.

METHOD

This research utilizes a qualitative descriptive method with a literature review design. The data population consists of published case studies, reviews, and research articles related to catamenial pneumothorax from 2000–2024, sourced from databases such as PubMed, Scopus, and Google Scholar. The study focuses on women of reproductive age experiencing CP, covering global case reports with emphasis on multidisciplinary management approaches.

The data sample includes 20 peer-reviewed articles and case reports that met inclusion criteria: articles discussing CP with clearly defined diagnosis, management, and outcomes. A purposive sampling technique was employed to select sources most relevant to the etiology, imaging, surgical methods, hormonal therapy, and recurrence rates. The research instrument was a document analysis form structured to extract data on clinical features, diagnostic modalities, therapeutic interventions, and outcome measures.
To ensure validity, the research followed a systematic search and review process using PRISMA guidelines. Reliability was achieved through triangulation of findings across studies. Data collection involved reading, coding, and synthesizing literature contents into thematic categories. Data analysis was conducted using content analysis techniques supported by NVivo software to map recurring themes, while reference management was handled with Mendeley. Analytical categories included pathophysiology, diagnostic tools, management strategies, and outcome comparison, culminating in a critical synthesis of best practices and research gaps.

RESULTS AND DISCUSSION

Clinical symptoms

Anamnesis is the main key to establishing a diagnosis of catamenial pneumothorax. Synchronization of the clinical course with menstruation is the main feature of the disease, but on the other hand intraoperative visual inspection and proper histological examination of pathogenic lesions are essential for the diagnosis of endometriosis-related pneumothorax. Doctors need to be vigilant because this can easily be missed if you are not careful. Medical history and the occurrence of typical symptoms are essential for the diagnosis of catamenial pneumothorax, and these findings should be investigated systematically, although the presence of these findings may raise a high suspicion of catamenial pneumothorax, the absence of these findings does not exclude the diagnosis of catamenial pneumothorax. Symptoms that arise intermittently outside the time of menstrual bleeding also cannot rule out the diagnosis of pneumothorax related to noncatamenial endometriosis even in the absence of symptoms and endometriosis perlvis (Aboujaoude et al., 2020; Celik & Erşen, 2019; Quercia et al., 2023).

Patients with catamenial pneumothorax were reported to have an average age of 35 years (range 15-54 years) when they first arrived. The clinical manifestations of catamenial pneumothorax are similar to spontaneous pneumothorax (pleuritic chest pain, cough, and shortness of breath) but in catamenial pneumothorax it is related to menstruation in women. Diaphragmatic irritation can cause pain that radiates to the periscapular region or radiates to the neck (most often on the right side) in most cases (92%) there is right hemitoractic involvement, 5% of left hemitarx cases, and 3% bilateral. Patients with a history of previous spontaneous pneumothorax episodes, a history of previous uterine surgery, primary or secondary infertility, diagnosis of pelvic endometriosis and a history of catamenial hemoptysis or catamenial hemothorax. The occurrence of pneumoperitoneum and catamenial pneumothorax can occur simultaneously, where the acute abdominal catamenial pneumoperitoneum in women with or without several episodes of pneumothorax (Celik & Erşen, 2019; Miedziarek & Kasprzyk, 2022; Quercia et al., 2023).

The clinical course of catamenial pneumothorax is usually mild or moderate in the first or early episodes, but can sometimes be found to be life-threatening such as life-threatening episodes of hemopneumothorax. Life-threatening hemopneumothorax has usually been treated with *tube thoracostomy* and *thoracotomy* where pulmonary resection, parietal pleurectomy, and partial diaphragm excision are required (Aboujaoude et al., 2020; Celik & Erşen, 2019).

Physical examination of the lungs at the inspection when static is found that the chest pain is convex from the healthy one, when the dynamic movement of the chest wall is swollen from the healthy one. Physical examination of palpation of sick phremitus weaker than healthy. Examination of pulmonary percussion patients with hypocrisy and sound healthy lungs.

Auscultation examination of the pulmonary breath sounds disappeared and the healthy broncochicular ones within normal limits, additional breathing sounds such as ronki and wizing were not found.

Supporting Examinations

Thoracic X-rays, CT scans, and MRI are imaging modalities that can be used for the diagnosis of catamenial pneumothorax. The specific diagnosis criteria for this disease are found defects in the diaphragm, pneumothorax usually occurs on the right side in this case, on the other hand there are left or bilateral side cases. Studies conducted in some cases, *water fluid levels* can also be seen on thoracic X-rays. Hemopneumothorax can also be part of the clinical course of the disease. Localized fluids can be seen in cases with a history of previous surgery (Celik & Erşen, 2019). Clinical suspicion is especially important in women of reproductive age with recurrent pneumothorax or hydropneuomothorax or pneumoperitoneum concomitantly with right-sided pneumothorax (Ondracek et al., 2021; Shrestha et al., 2019).

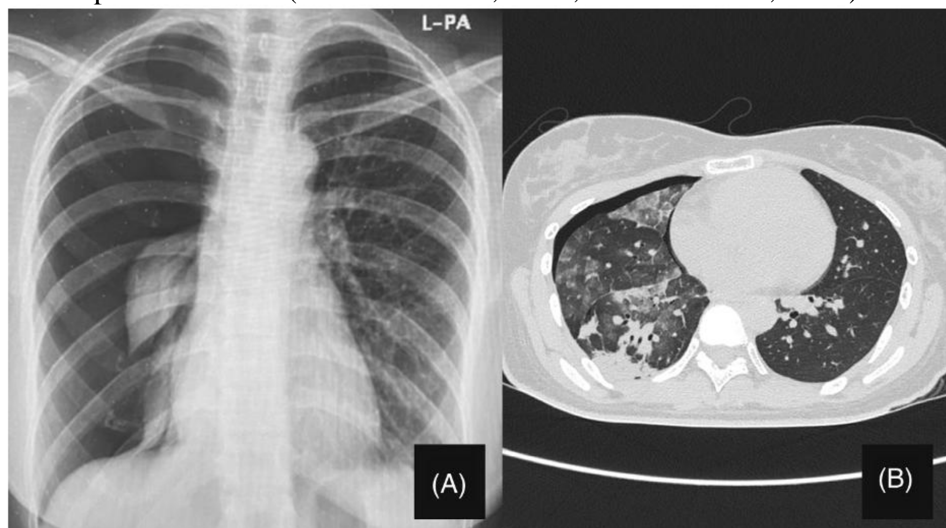

Figure 2. Picture of pneumothorax on the right side of the lung.
Quoted from (Pratomo et al., 2023)

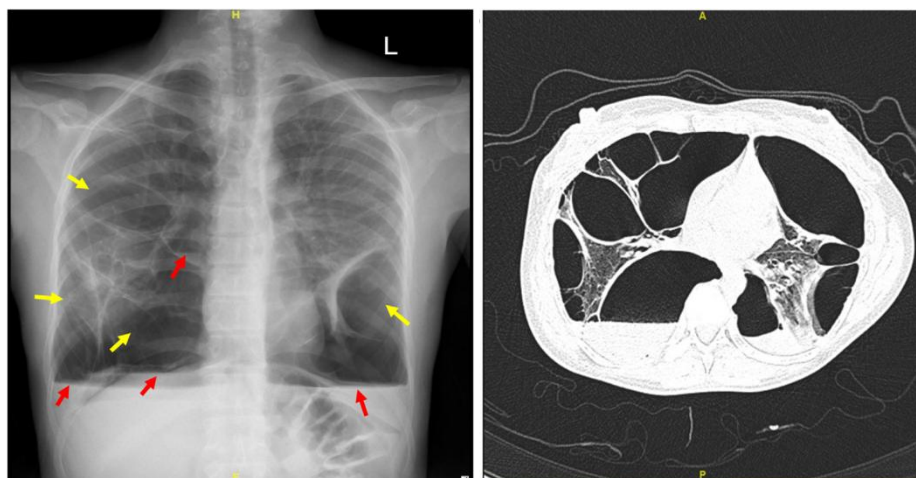

Figure 3. (**Right**) PA chest and lateral radiographs show many thin-walled structures/bubbles containing air, some showing *fluid levels*. Yellow arrow: bubble. Red arrow: The height of the airborne liquid. (**Left**) Axial thoracic CT scan shows many structures with air that compress the pulmonary parenchyma below and some show the presence of *water fluid levels*. Yellow arrow: bubble. Red arrow: *water fluid level*.
Quoted from (S et al., 2019)

CT scan and *magnetic resonance imaging* (MRI) examinations are the main modalities, however, their sensitivity and specificity in diagnosing diaphragmatic or thoracic endometriosis are still unclear. CT scans are usually done first because they are available at the referral hospital, are independent of the user, and are economical. Contrast CT scans can increase its sensitivity to identify lesions on the diaphragm. Thoracic X-rays of the chest have a minimal role in the diagnosis of pleural and diaphragmatic lesions (Aboujaoude et al., 2020; Gil & Tulandi, 2020).

Cases of minor diaphragmatic defects can be detected by careful thoracic X-ray examination, which refers to diaphragmatic perforation. Right-sided pneumothorax with spherical opacity of the right hemidiaphragm may occur, suspected of the presence of a protrusion of the liver into a large diaphragmatic defect. Types of partial intrathoracic liver herniations in the right hemisphere on thoracic X-rays and thoracic CT scans have been reported in some literature. Reports in the literature regarding diaphragmatic mass on CT and pleural mass on MRI refer to endometrial implantation. The findings of hemoptysis CT are not specific, the picture may differ from *ground glass* opacity to consolidation due to alveolar filling, similar to hemoptysis caused by other diseases. The early period of the disease may be present in the endobronchial, which in some cases leads to atelectasis. Reports that reveal band-like opacity refer to the location of linear fibrosis caused by chronic bleeding (Aboujaoude et al., 2020; Celik & Erşen, 2019).

Thoracic CT examination during menstruation shows pulmonary bleeding and catamenial changes compared to extramenstrual events, thoracic CT scans performed after menstrual periods help characterize nodular lesions and show complete resolution of pulmonary bleeding, which is an important criterion for diagnosis (Aboujaoude et al., 2020; Celik & Erşen, 2019). CT scans can show a picture of multiloculated pneumothorax, CT scans can also show several localized air pockets in the right hemitoracx due to some adhesions from previously repeated pneumothorax (Staring et al., 2021).

MRI examination is another imaging modality that can be used to confirm thoracic endometriosis in some cases. CT has some drawbacks especially in spatial resolution, but MRI has a high contrast resolution and can better characterize hemorrhagic lesions. Representation of diaphragm or pleural implantation with MRI can help clarify the diagnosis and management of patients with catamenial pneumothorax. MRI examinations are reported to be superior in diagnosing diaphragmatic lesions, pleural nodules, and hemorrhagic lesions because their sensitivity to soft tissues is better than CT at 78% to 83%. This imaging technique seems to be more sensitive when done during menstruation. MRI modalities are also useful for patients with catamenial hydropneumothorax; small pleural endometrioma characterized by the presence of small hyperintense cystic lesions can be detected by MRI imaging of the visceral or parietal pleura. Pneumothorax and pneumoperitoneum occurring simultaneously are other findings that can be seen on radiography and CT scans (Aboujaoude et al., 2020; Celik & Erşen, 2019; Gil & Tulandi, 2020).

Diagnosis

The definitive diagnosis of catamenial pneumothorax or gold standard is the discovery of thoracic endometriosis cells on histopathological examination through surgical procedures both VATS and thoracotomy. A study conducted by Korom S *et al*, the diagnosis of catamenial pneumothorax, reported that 52.1% of patients diagnosed were confirmed with the VATS procedure with the most common finding being endometriosis lesions (Aboujaoude et al., 2020; Ciriaco et al., 2022; Gil & Tulandi, 2020). Catamenial pneumothorax should always be part of the comparative diagnosis in women of reproductive age with chest pain and shortness of breath associated with menstruation.

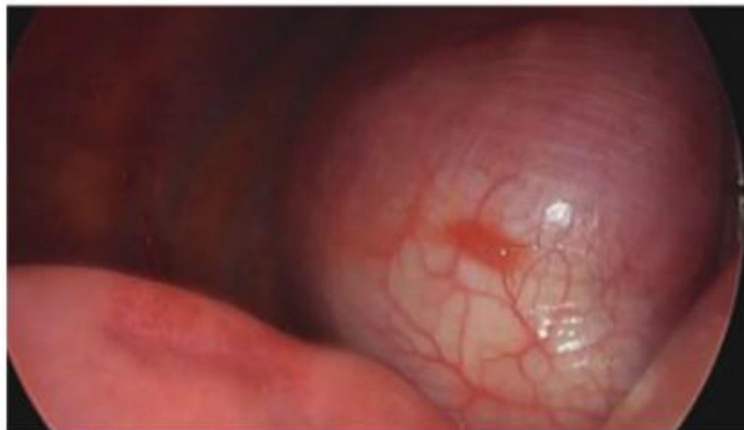

Figure 4. Endometriosis Pleura Quoted from (Chandra et al., 2024)

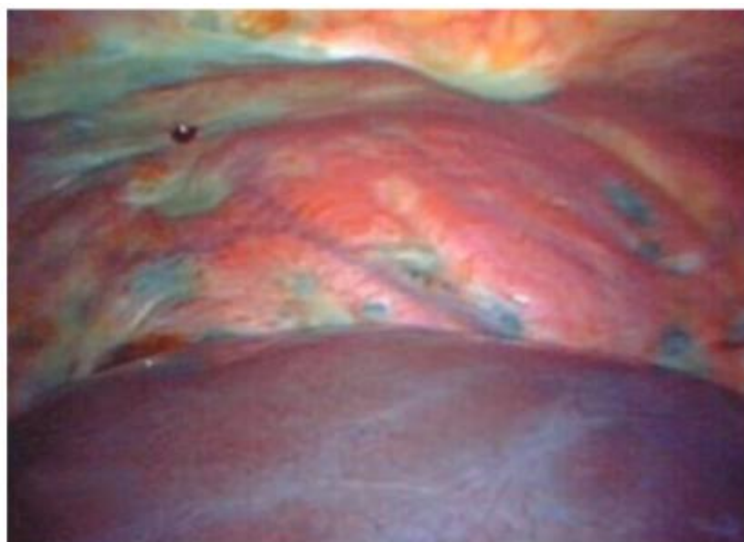

Figure 5. Diffuse endometriosis of the diaphragm
Quoted from (Chandra et al., 2024)

Management And Prognosis

General Rules

Cataryngeal pneumothorax with mild symptoms is usually treated with *bed rest* and thoracentesis or *chest tube* to relieve symptoms. Surgical treatment is carried out by thoracoscopy and pleurodesis is recommended to reduce recurrence. Surgery is usually performed when conservative treatment fails or in women who have relapsed. Postoperative treatment with GnRH agonists or oral contraceptives similar to pelvic endometriosis may be given to relieve symptoms and reduce recurrence (Gil & Tulandi, 2020; Kaya et al., 2020; Quercia et al., 2023).

Treatment options for catamenial pneumothorax include aspiration where air is manually expelled through a catheter or needle (thoracocentesis), a similar approach is the use of *a one-way Heimlich valve*. The second option is a thoracostomy tube which involves the installation *of a chest tube*/thoracic drainage into the pleural cavity with the application of *suction* and *water seal drainage* (WSD) until the lungs expand again. The third option is chemical sclerosis or pleurodesis in which chemicals or sclerosis are inserted through the *chest tube* after thoracic drainage to cause chronic inflammation and scarring on the surface of the pleura that promotes adhesion between the lungs and the chest wall, thus preventing collapse, but a single chemical pleurodesis can be given for catamenial pneumothorax therapy. The fourth option is endometrial suppressant hormone therapy which most commonly involves the

use of progestins and GnRH agonists, to induce chemical menopause, this is done after thoracic drainage (Ciriaco et al., 2022; Okyere et al., 2019; Pratomo et al., 2023; Wang et al., 2021).

Suppression of the ovaries with GnRH agonists and additional treatment will reduce the adverse effects of menopausal symptoms. GnRH agonists are administered intramuscularly, whereas relatively new GnRH antagonists can be administered orally, but there are no data on the use of GnRH antagonists for thoracic endometriosis. Patients planning to become pregnant, continuous use of oral contraceptives or GnRH agonists or antagonists with additional therapy is required. This GnRH agonist therapy will reduce the likelihood of recurrence of catamenial pneumothorax and suppress pelvic endometriosis that occurs at the same time (Gil & Tulandi, 2020).

Observation

Observation is a simple method that can be performed on pneumothorax patients that indicates that the air leakage has been closed (no further development or addition of pneumothorax). This conservative treatment of pneumothorax is not a new method. In 1966, Straddling and Poole reported that the safety and progress of conservative management and the risk of mild symptoms in pneumothorax patients. Patients with catamenial pneumothorax at the first visit can be applied observation therapy, with strict monitoring of symptoms, if symptoms increase accompanied by physiological instability then interventional therapy may be the next therapy option.

Aspirations

Pneumothorax aspiration is a minimally invasive therapy that has been recommended by some experts but has shown varying degrees of success. A meta-randomized controlled trial study of simple aspiration versus chest drain installation concluded that simple aspiration was more advantageous given the time spent on hospitalization becoming shorter and there was no significant difference in recurrence rate within 1 year.

A more recent meta-analysis study of all hemodynamically stable adults with spontaneous pneumothorax versus needle aspiration versus a small perforated chest (catheter <14 French) compared to chest tubes and found no statistical differences between these different forms of therapy. Patients with secondary pneumothorax or spontaneous pneumothorax recurrence generally do not have good outcomes with simple aspiration.

Chest Drain

Pneumothorax with an emergency requires immediate treatment, one of which is with chest drain. Chest drain is proven to address pneumothorax with appropriate installation location and depth. In general, the safe location for the placement of the pleural catheter is the lateral chest wall above the fourth to sixth rib bones with the middle to anterior axillary mid line. The installation of chest drains on small pneumothorax can be placed in the second and third intercostal spaces.

Chest drain with large holes has essentially been replaced by the insertion of a catheter that is attached under ultrasound guidance. The main indications for large hole chest tube insertion are hemothorax and selective cases of small pneumothorax in patients using mechanical ventilation where the risk of lung injury is considered too high to insert a catheter by inserting a needle.

A variation of the use of pleural drainage systems is the replacement of a one-way valve to allow for early discharge from the emergency department or hospital with outpatient management and then *ambulatory management*. The most common procedure is *a heimlich flutter* valve which is very useful in cases where there is a prolonged fistula but surgical therapy is rejected or not possible.

Pleurodesis

Pleurodesis can be an additional layer of therapy that can be used in conjunction with other therapies. The main purpose of pleurodesis is to connect the visceral and parietal pleura, and from pleurodesis can prevent recurrence in both primary and secondary pneumothorax. Pleurodesis can be mechanically performed as part of a therapeutic procedure in catamenial pneumothorax, the pleurodesis procedure accompanied by hormonal therapy can achieve a success rate of 70 – 80%. Simple abrasion on the surface of the parietal pleural can also be done by inserting chemical materials (Pathak et al., 2019).

Pleurodesis is a procedure that attaches the lungs to the chest wall, so that this procedure can eliminate the space between the lungs and the chest wall, it is hoped that fluid and air cannot accumulate between these layers. There are 2 types of pleurodesis, the first is chemical pleurodesis involves the injection of irritants such as talc, doxycycline or bleomycin into the pleural cavity in general through *a chest tube.* These chemicals can cause inflammation that makes the pleural layers stick to each other. Both mechanical pleurodesis procedures are performed through surgery, where the pleural surface is mechanically stimulated to cause inflammation and adhesion (Changsung et al., 2023).

Operative Therapy

The use of thoracoscopy/*Video-assisted thoracic surgery* (VATS) is the best standard diagnostic and treatment modality for catamenial pneumothorax that allows for a variety of treatment modalities depending on the characteristics of the lesion identified. The VATS surgery uses fiber optic binoculars to visualize the lungs, pleura, and diaphragm so that diaphragm repair, bleb resection, and pleurodesis can be performed at the same time during this procedure. Pleural abrasion, which is mechanical pleurodesis, is in the form of scraping or "rubbing" the pleural surface during thoracoscopy or thoracotomy, so that the inflammation that arises will form an adhesion between the lungs and the pleural surface (Aboujaoude et al., 2020; Okyere et al., 2019; Pratomo et al., 2023).

Surgery other than VATS is thoracotomy with pleurectomy. Thoracotomy is performed to see the lungs, diaphragm, and pleura directly by opening the pulmonary cavity. Pleurectomy is a removal of the pleura, which is designed to encourage adhesion of the lungs directly to the chest wall, during which thoracotomy repair of diaphragm perforation or repair of penetration using *polymesh* can also be performed. The procedure was introduced in 2003 and uses *a vicryl-type* mesh installed throughout the diaphragm, to cover small fenestrations that may not be visible to the surgeon. The material *vicryl* allows it to cause tissue growth to form large scar tissue above the diaphragm (Okyere et al., 2019; Ondracek et al., 2021).[19]

Bilateral salloophrectomy through laparotomy or laparoscopy to remove both ovaries to induce menopause is also considered to limit estrogen production and suppress endometrial implantation to prevent bleeding. Termination of the menstrual cycle has been shown to be an effective treatment for catamenial pneumothorax. Management of catamenial pneumothorax, *chest tube* should be installed after clinical assessment. Followed by chemical pleurodesis and continued with hormonal therapy. This combination therapy is relatively effective in central hospitals with limited resources (Chandra et al., 2024; Okyere et al., 2019).

Special Procedures

1. Hormonal

Gonadotropin-releasing hormone (GnRH) agonists are used in first-line treatment, as they are highly effective in inducing hypogonadotropic hypogonadism and amenorrhea. The recurrence rate after a single hormonal therapy is reported to be more than 50%, lower than that of surgical therapy, therefore surgery should be considered in patients with recurrent

diseases undergoing hormonal therapy. Hirata et al, in their study reported the usefulness of a combination of surgical and postoperative hormonal therapy to reduce recurrence. Studies recommend a combination of surgery and GnRH agonist therapy for 6-12 months.

Long-term use of GnRH agonists causes hypoestrogenic effects that cause symptoms similar to menopause and osteoporosis, which may result in discontinuation of use. Discontinuation of hormonal therapy is associated with a high rate of recurrence, therefore long-term hormonal therapy is required for the management of catamenial pneumonia. Continuous oral contraceptives are suggested to be a suitable alternative for long-term use. This continuous regimen avoids bleeding which can reduce the frequency of catamenial symptoms (Okyere et al., 2019; Sugimura et al., 2019).

An oral GnRH antagonist (elagolix) is also reported to be effective in reducing endometriosis-related symptoms. In contrast to GnRH agonists, GnRH antagonists induce rapid and reversible suppression of ovarian hormone levels without an initial reaction that increases within 1 to 2 weeks, which can lead to endometriosis-related symptoms. Long-term use for 12 months, hypoestrogenic side effects such as heat may be less compared to GnRH agonists, thus, treatment with GnRH antagonists may be effective candidates for hormone therapy for catamenial pneumothorax in the future (Hirata et al., 2020).

Prognosis

The biggest problem of catamenial pneumothorax is a reported high recurrence rate of 8 – 40% during the 12 months after surgery. Postoperative catamenial pneumothorax recurrence or recurrence rate occurred in 29.0% of pleural and diaphragmatic endometriosis cases, this figure is higher than the recurrence rate of spontaneous pneumothorax cases with other causes, which is 5%. A combination of surgery, pleurodesis and postoperative hormone therapy is currently the most effective management method to reduce these recurrence rates (Hirata et al., 2020).

Research conducted by Pathak *et al*. conducted from 2003 to 2018 at Glenfield Hospital, Leicester UK, found the rate of recurrence of catamenial pneumothorax based on the following interventions: Hormone Therapy (HT) alone (58.5%), surgery (63.3%), surgery with chemical pleurodesis (50%), surgery with HT (16%), surgery with chemical pleurodesis and HT (0%). Research is urgently needed because scientific research on the prognosis of catamenial pneumothorax has not been widely carried out (Pathak et al., 2019).

CONCLUSION

Catamenial pneumothorax (CP), a rare condition affecting 3-6% of women with spontaneous pneumothorax (average age 35), has multiple etiopathological theories (diaphragmatic defects, endometrial migration). Diagnosis requires pneumothorax symptoms occurring 24 hours before to 72 hours after menstruation, supported by imaging and histopathology. Management ranges from conservative (oxygen, aspiration) to invasive (chest tube, pleurodesis, VATS/thoracotomy) and hormonal therapy, yet recurrence remains high (20-30%), though pleurodesis with hormonal suppression reduces it by 70-80%. Future research should focus on a **prospective multicenter study** comparing long-term outcomes of surgical (VATS/pleurodesis) and hormonal therapies (OCPs, GnRH analogs) to optimize recurrence prevention, clarify pathogenesis (via intraoperative/histopathological correlation), and refine diagnostics (biomarkers, MRI). This could establish evidence-based guidelines, improve multimodal therapy, and link CP management to endometriosis treatment, addressing critical gaps in this challenging condition.

REFERENCES

Aboujaoude, N., Iskandar, M., & Tannouri, F. (2020). Catamenial hemoptysis: A case report of pulmonary endometriosis. *Eur J Radiol Open*, *8*, 302–303.

Celik, S., & Erşen, E. (2019). *catamenial pneumotaxs*.

Chandra, A., Sutanto, R., & Sutanto, A. (2024). Catamenial pneumothorax: Pathophysiology, diagnosis, and management. *Faculty of Medicine, University of Indonesia*, *15*(8), 452–455.

Changsung, H., Jonggeun, L., Joeng, S., & Hyo, Y. (2023). Which is the more effective option for pleurodesis to prevent the recurrence of malignant pleural effution. *Journal of chest surgery*, *56*(5), 353–354.

Ciriaco, P., Muriana, P., Carretta, A., Ottolina, J., Candiani, M., & Negri, G. (2022). Catamenial pneumothorax as the first expression of thoracic endometriosis syndrome and pelvic endometriosis. *J Clin Med*, *11*(5), 1200–1207.

Gil, Y., & Tulandi, T. (2020). Diagnosis and Treatment of Catamenial Pneumothorax: A Systematic Review. *J Minim Invasive Gynecol*, *27*(1), 48–53.

Hirata, T., Koga, K., & Osuga, Y. (2020). Extra-pelvic endometriosis: A review. *Reprod Med Biol*, *19*(4), 323–333.

Kaya, C., Iliman, D. E., Eyuboglu, G. M., & Bahceci, E. (2020). Catamenial pneumothorax: multidisciplinary minimally invasive management of a recurrent case. *Kardiochir Torakochirurgia Pol*, *17*(2), 107–109.

Miedziarek, C., & Kasprzyk, M. (2022). Catamenial pneumotoraks - are there benefits of cooperation between the surgeon and the gynaecologist? *Prz Menopauzalny*, *21*(1), 69–72.

Nizami, M., Mani, A., & Begum, S. (2019). Catamenial hemothorax: A rare case of thoracic endometriosis. *Ann Thorac Surg*, *108*(2), 127–128.

Okyere, I., Glover, P. S. K., Forson, P. K., Okyere, P., & Blood-Dzraku, D. (2019). Catamenial pneumothorax in Ghana: case report and literature review. *Pan Afr Med J*, *33*, 287–289.

Ondracek, R., Khan, M., Sundaram, R., & Others. (2021). The Silent Killer: An Asymptomatic Catamenial Pneumotaxis in a Patient with a Previous Partial Hysterectomy. *Am J Respir Crit Care Med*, *203*, 918–921.

Pathak, S., Caruana, E., & Chowdhry, F. (2019). Should surgical treatment of catamenial pneumothorax include diaphragmatic repair. *Interact CardioVasc Thorac Surg*, *29*, 906–910.

Pratomo, I., Putra, M., Bangun, L., & Others. (2023). Video-assisted surgical diagnosis and pleural adhesion management in catamenial pneumothorax: A case and literature review. *Respirol Case Rep*, *11*(4), 123–126.

Quercia, R., De Palma, A., De Blasi, F., & others. (2023). Catamenial pneumothorax: Not only VATS diagnosis. *Front Surg*, *10*, 462–465.

S, A., Y, A., & M, A. (2019). Bilateral catamenial hemopneumothorax: Diagnostic & management challenges. *Int J Surg Case Rep*, *61*, 271–274.

Shrestha, B., Shrestha, B., Peters, P., Ura, M., Windsor, M., & Naidoo, R. (2019). Catamenial pneumothorax, a commonly misdiagnosed thoracic condition: multicentre experience and audit of a small case series with review of the literature. *Heart Lung Circ*, *28*(6), 850–857.

Staring, G., Monteiro, F., Barracha, I., & Others. (2021). Multi-Loculated Catamenial Pneumotorax: A Rare Complication of Thoracic Endometriosis. *Cureus*, *13*(8), 583–586.

Sugimura, K., Sasaki, O., Shinoda, M., Kawasaki, S., & Shinkai, M. (2019). Catamenial pneumothorax: a cause of monthly breathlessness. *Lancet*, *394*(10202), 952–955.

Wang, P., Meng, Z., Li, Y., & Xu, Z. (2021). Endometriosis-Related Pleural Effusion: A Case Report and a PRISMA-Compliant Systematic Review. *Front Med (Lausanne)*, *8*, 1048–1051.