



Case Report

Pericardial dual mesh uptake on PET scan mimicking residual mesothelioma; a case report

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ABSTRACT

Introduction: Malignant pleural mesothelioma (MPM) is a rare and aggressive cancer that typically arises from the mesothelial linings of the lungs. The current study presents a rare case of MPM with a good clinical response to chemotherapy, associated with pericardial dual mesh uptake in PET scan upon follow up.

Case presentation: A 33-year-old male presented with dyspnea, severe headache for a period of a month. He had history dendritic cell sarcoma which had been managed by 21 cycles of radiotherapy. Chest x. ray showed multiple pleural based masses. Chest computed tomography scan showed multiple lobulated pleural masses involving right hemithorax. Pleural biopsy showed epithelial type-mesothelioma. The patient underwent 3 sessions of combination chemotherapy followed by pleurectomy. The patient's response to chemotherapy was optimal and 5 month-PET scan follow up showed uptake by the implanted mesh.

Discussion: MPM is reported to be directly linked to asbestos exposure with poor prognosis. The current optimal management regarding MPM is lacking. Even though PET scan is highly sensitive, sites of infections, inflammation, and healing of surgical scars have been reported to show uptake, leading to a false positive result.

Conclusion: The best therapeutic approach regarding MPM can be multimodal therapies that include surgery, radiotherapy, and chemotherapy before and after surgery. PET scan follow up of patients with previous mesh implantations can show uptake and mimic malignancy.

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1. Introduction

Malignant pleural mesothelioma (MPM) is a rare, highly aggressive and devastating type of cancer that typically arises from the mesothelial linings of the lungs [1]. It is thought to be linked to asbestos exposure and is mostly associated with very poor prognosis with short life expectancy [2]. The incidence rate of MPM is reported to be 10/million with much higher in male with worse survival rate [3]. Despite their rarity, worldwide incidences of MPM are continuously rising, especially in the developing countries

which will in turn increase the mortality rates of the disease [4]. While progress regarding the successful management of MPM have been made in the past decade and drug combinations have been tested, outcome improvement has been only but modest [3]. Hence, unfortunately the optimal management approach of MPM is currently controversial and remains a critical challenge to physicians [5]. F-18 fluorodeoxyglucose (FDG) positron emission tomography (PET) scan is widely used in the screening of various human cancers, including MPM, to determine their malignancy, efficacy of used chemotherapy and to aid in the management process [6]. Even though PET scan is highly reliable and has a high sensitivity, other non-cancer cells have been reported to uptake FDG, such as in sites of infections, inflammation, and healing of surgical scars, leading to a false positive result [7]. The uptake of

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surgical mesh in PET scan has been observed rarely in the literature, which can easily mimic malignancy [8,9].

The aim of the current study is to present a rare case of MPM with good clinical response to chemotherapy, associated with pericardial dual mesh uptake in PET scan upon follow up. The report has been written in line with SCARE 2020 guidelines [10].

Patient Information: A 33-year-old married male, manual worker presented with dyspnea associated with chest pain and severe headache for a month. He had a history dendritic cell sarcoma in the neck before 7 years, managed with resection and 21 cycles of radiotherapy. He was assigned to be cured from the disease.

Clinical findings: the patient was dyspneic, there was decrease air entry on the right side. SPO2 on room air was 89%.

Diagnostic assessment: chest x. ray showed multiple pleural based masses with decrease right lung volume (Fig. 1). Chest computed tomography (CT) scan showed multiple lobulated pleural masses involving right hemithorax (Fig. 2). Open pleural biopsy under local anesthesia and sedation was performed. The result of the histopathological examination showed epithelial type-mesothelioma.

Therapeutic intervention: The patient underwent 3 sessions of cisplatin and pemetrexed combination chemotherapy. About 80% of the masses regressed. The patient was prepared for general anesthesia. In left lateral position, through classical thoracotomy incision, total pleurectomy was performed. Part of the diaphragm with the right side of the pericardium was resected. The resected part of the pericardium was replaced by a dual surgical mesh (4 × 10 cm) followed by a final session of cisplatin and pemetrexed chemotherapy.

Follow-up and outcomes: The MPM was successfully removed and the patient's response to chemotherapy was optimal. In the 5th month after surgery, PET scan of the patient suggested the evidence of avid uptake along the right paracardiac region of about 4 × 10 cm, mimicking tumor recurrence. Other PET scan with six month interval showed the same shadow with lessor activity. One year later, the patient was healthy and free of reoccurrence.



Fig. 1. Plain chest x-ray shows multiple lobulated shadow at the periphery of the right hemithorax.

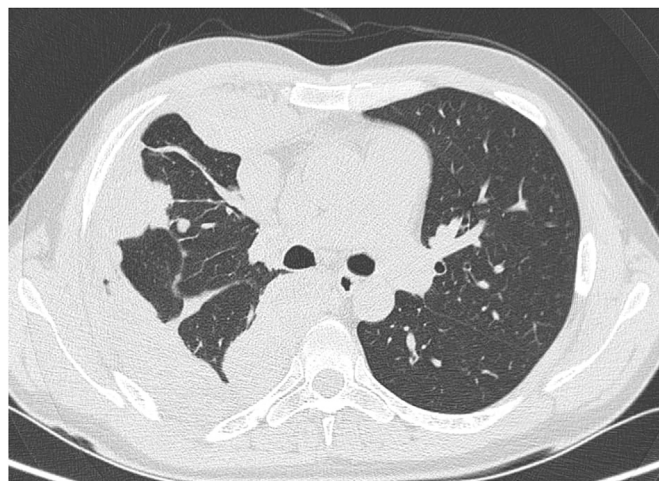


Fig. 2. Computed tomography scan (axial view) showing multiple pleural based lobulated masses suspecting mesothelioma.

2. Discussion

MPM is a rare neoplasm of the pleura with a very high tendency for malignancy [1]. Malignant mesothelioma may develop in different parts of the body besides the pleura, such as in the peritoneum, tunica vaginalis, and pericardium. MPMs constitute nearly 70% of all malignant mesothelioma cases followed by nearly 30% in the peritoneum with very rare occurrence in other epithelial linings [11].

Regarding the pathogenesis of MPM, it has been reported that 80% of all cases are correlated to asbestos exposure, even though a portion (20%) of the patients have not been reported to have any asbestos exposure, indicating a genetic risk factor in these cases [4]. According to the previous researches, males are the main affected gender for the disease with a mean age of 75 years [12]. Symptoms associated with MPM may develop after extensive progression of the disease, which can include dyspnea, chest pain, pleural effusion in more than 60% of the cases [13]. The case in the current study was a 33-year-old male without any known exposure to asbestos, he was presented with dyspnea, chest pain, and severe headache for a period of one month.

Based on the symptoms and the history of asbestos exposure, chest CT scan can be performed to visualize the extend and location of the tumor [14]. Meanwhile PET scan has been commonly used in the diagnosis of mesotheliomas which have been proven to be more reliable in regard of cancer staging when compared to CT counterpart [15]. However, biopsy and histological examination are crucial to examine viable cancer cells and to confirm the diagnosis of MPM [5]. Despite the reliability of PET scan, they have been reported to be associated with occasional false positive results in a few clinical settings, such as surgical scars, inflammation, and infection [7].

The management of MPM presents an extreme challenge as it is well known by its poor prognosis and fatality, with a life expectancy of 12–18 months [2]. Treatment options regarding MPM are limited and patient response to chemotherapy treatment is very poor with only 35% via the administration of combined cisplatin and pemetrexed, and even less when cisplatin is administered alone. Even if any response is achieved through the combination of these drugs, cancer progression continues [16,17]. Despite some progression in MPM therapy in the past decade, the optimal management approach is yet to be addressed. However, two therapeutic approaches have usually been used regarding MPM treatment; induction chemotherapy followed by resection, and

resection followed by chemotherapy. Yet, increase in survival rate has been rather small [18]. According to a study by Thomas and colleagues in 2020, the addition of radiotherapy to the combination of chemotherapy plus resection might improve clinical outcome of these cases, however sufficient data regarding this trimodal therapy is currently lacking [3]. In this study, the patient underwent 3 sessions of cisplatin and pemetrexed chemotherapy induction followed by resection of the tumor and the implantation of a dual pericardial surgical mesh proceeded by a final session of cisplatin and pemetrexed chemotherapy.

Surgical mesh is usually used in inguinal hernioplasty. Mesh implants have rarely been reported to contribute to postoperative false positive result in PET scan due to FDG uptake, which can easily be mistaken for malignancy [7,9,19–21]. In some cases, mesh uptake can be detected even 25 years after implantation [22]. In the 5th month after surgery, PET scan of the patient suggested the presence of a malignant intrathoracic tumor in the mesh location, which indicated a false positive result of FDG PET scan.

In conclusion; MPM is a rare type of cancer with an increasing incidence and poor survivability that rarely responds to chemotherapy and other unimodal approaches. The best therapeutic approach can be multimodal therapies that include surgery, radiotherapy, and chemotherapy before and after surgery. Follow up of patients with previous mesh implantations via FDG PET scan can produce false positive result by mimicking malignancy, hence require careful revision of patient history to avoid misinterpretation.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Conflicts of interest

There is no conflict to be declared.

Sources of funding

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Ethical approval

Approval is not necessary for case report.

Consent

Consent has been taken from the patient and the family of the patient.

Author contribution

Fahmi H Kakamad, Rebaz M. Ali: surgeon and physician managing the patient. Follow up the patient, and final approval of the manuscript. Diyar A Mohammed, Abdulwahid M Salih, Dahat A Hussein, Mohammed Q Mustafa, Shvan H Mohammed, Shakhawan I Hussein: literature review, writing the manuscript, final approval of the manuscript.

Registration of research studies

Registration is not necessary for case report according to the editor's previous comment.

Guarantor

Fahmi Hussein Kakamad is the Guarantor of submission.

Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.ijso.2022.100442>.

References

- [1] Kerrigan K, Chipman J, Jo YJ, Haaland B, Johnson E, Puri S, et al. Real-world survival outcomes of patients with malignant pleural mesothelioma by physician's choice of first-line platinum chemotherapy. *J Thorac Oncol* 2021;16(3):S122–3.
- [2] Wu L, de Perrot M. Radio-immunotherapy and chemo-immunotherapy as a novel treatment paradigm in malignant pleural mesothelioma. *Transl Lung Cancer Res* 2017;6(3):325.
- [3] Thompson AB, Quinn TJ, Siddiqui ZA, Almahariq MF, Grills IS, Stevens CW. Addition of radiotherapy to surgery and chemotherapy improves survival in localized malignant pleural mesothelioma: a Surveillance, Epidemiology, and End Results (SEER) study. *Lung Cancer* 2020;146:120–6.
- [4] Patel SC, Dowell JE. Modern management of malignant pleural mesothelioma. *Lung Cancer Targets Ther* 2016;7:63.
- [5] Cinausero M, Rihawi K, Sperandi F, Melotti B, Ardizzone A. Chemotherapy treatment in malignant pleural mesothelioma: a difficult history. *J Thorac Dis* 2018;10(Suppl 2):S304.
- [6] Kruse M, Sherry SJ, Paidpally V, Mercier G, Subramaniam RM. FDG PET/CT in the management of primary pleural tumors and pleural metastases. *Am J Roentgenol* 2013;201(2):W215–26.
- [7] Bahçeci T, Nursal GN, Aydın M. Intense FDG uptake around the inguinal surgical mesh 5 years after operation: case report and review of the literature. *Mol. Imag. Radionucl. Therap.* 2012;21(1):35.
- [8] Franceschi A, Friedman K, Ghesani M. Inguinal hernia repair mimicking cancer on PET-CT: mesh is cool, but the plug lights up. *J Nucl Med* 2015;56(supplement 3):1426.
- [9] Chism CB, Somcio R, Chasen BA, Ravizzini GC. Increased 18F-FDG uptake associated with gastric banding surgical mesh on PET/CT. *Clin Nucl Med* 2016;41(5):410–1.
- [10] Agha RA, Franchi T, Sohrabi C, Mathew G, Kerwan A, Thoma A, et al. The SCARE 2020 guideline: updating consensus Surgical CAse REport (SCARE) guidelines. *Int J Surg* 2020;84:226–30.
- [11] Ahmed I, Tipu SA, Ishtiaq S. Malignant mesothelioma. *Pakistan J. Med. Sci.* 2013;29(6):1433.
- [12] Sugarbaker DJ, Wolf AS. Surgery for malignant pleural mesothelioma. *Expert Rev Respir Med* 2010;4(3):363–72.
- [13] Bibby AC, Tsim S, Kanellakis N, Ball H, Talbot DC, Blyth KG, et al. Malignant pleural mesothelioma: an update on investigation, diagnosis and treatment. *Eur Respir Rev* 2016;25(142):472–86.
- [14] Ryu JW, Kim YS. A case of advanced malignant pleural mesothelioma treatment with chemotherapy and photodynamic therapy. *Tuberc Respir Dis* 2015;78(1):36.
- [15] Bech C, Sørensen JB. Chemotherapy induced pathologic complete response in malignant pleural mesothelioma: a review and case report. *J Thorac Oncol* 2010;5(5):735–40.
- [16] Disselhorst MJ, Baas P. Chemotherapy options versus “novel” therapies: how should we treat patients with malignant pleural mesothelioma. *Transl Lung Cancer Res* 2020;9(Suppl 1):S77.
- [17] Treasure T, Lang-Lazdunski L, Waller D, Bliss JM, Tan C, Entwistle J, et al. Extra-pleural pneumonectomy versus no extra-pleural pneumonectomy for patients with malignant pleural mesothelioma: clinical outcomes of the Mesothelioma and Radical Surgery (MARS) randomised feasibility study. *Lancet Oncol* 2011;12(8):763–72.
- [18] Verma V, Ahern CA, Berlind CG, Lindsay WD, Grover S, Friedberg JS, et al. Treatment of malignant pleural mesothelioma with chemotherapy preceding versus after surgical resection. *J Thorac Cardiovasc Surg* 2019;157(2):758–66.
- [19] Jung SA, Kim DW, Park SA, Kim CG. Abdominal mesh implant showing FDG uptake on PET/CT. *Nucl. Med. Mol. Imag.* 2010;44(3):223–5.
- [20] Yilmaz M, Sevinc A, Aybasi N, Celen Z, Zincirkeser S. FDG uptake in abdominal mesh implant on FDG PET/CT. *Clin Nucl Med* 2008;33(5):351–2.
- [21] Aide N, Deux JF, Peretti I, Mabilille L, Mandet J, Callard P, et al. Persistent foreign body reaction around inguinal mesh prostheses: a potential pitfall of FDG PET. *Am J Roentgenol* 2005;184(4):1172–7.
- [22] Koljevic-Markovic A, Orcurto MV, Doenz F, Delaloye AB, Prior JO. Persistent FDG uptake around an inguinal mesh prosthesis 25 years after implantation. *Clin Nucl Med* 2007;32(3):242–3.