

Case Report

Endometriosis Associated Striated Muscle Changes: Simulating Tumor

Rusella Mirza , Jehan Abdulsattar, and James Cotelingam

Department of Pathology and Translational Pathology, Louisiana State University Health Science Center, Shreveport, LA 71103, USA

Correspondence should be addressed to Rusella Mirza; rmirza@lsuhsc.edu

Received 24 November 2020; Revised 6 January 2021; Accepted 22 January 2021; Published 2 February 2021

Academic Editor: George Adonakis

Copyright © 2021 Rusella Mirza et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Endometriosis in the abdominal wall can be a diagnostic challenge, both clinically and pathologically. We are describing a case of abdominal wall endometriosis where regenerative muscle cells are florid. The cells are small and polygonal in shape, arranged in groups, and intersecting through differentiated skeletal muscle. Cells have pink cytoplasm and a centrally located nucleus. Immunohistochemistry demonstrates diffuse positivity with S100 and CD56, and they are negative with Ae1/Ae3, Pax8, inhibin, calretinin, and CD68. Cells are also focally positive with actin, vimentin, and myogenin. Electron microscopy reveals the presence of intracytoplasmic myofibrils. These groups of small cells are compatible with early to intermediately differentiated skeletal muscle cells as demonstrated by histomorphology, immunohistochemical pattern, and ultrastructure analysis. Muscle undergoes a regenerative process following injury. Endometriosis associated regenerative changes in muscle are very rare as documented in the English literature. The presence of florid regenerative muscle cells mimics a neoplastic process. In this report, we describe the histomorphological and immunohistochemical pattern of regenerative muscle groups and discuss differential diagnoses. We found electron microscopy to be an important diagnostic tool in this case.

1. Introduction

Endometriosis is defined as the presence of the functional endometrial gland and stroma at an ectopic location. Most common locations are the ovary, broad ligament, fallopian tube, and nearby pelvic organs. Extrapelvic endometriosis is very rare, especially at the anterior abdominal wall location [1–3]. Patients with endometriosis at the abdominal wall usually present with a painful mass which is suspected as hernia or neoplasm [4]. Most of the time, the patient has a history of cesarean section and sometimes has a history of endometriosis at another location. The mass is usually present for a couple of years, and the patient complains of cyclic or periodic pain [4]. Endometriosis at the abdominal wall can be a diagnostic dilemma for both clinicians and pathologists. Endometriosis is a benign process; however, malignant transformation may occur [5, 6]. Endometriosis in the skeletal muscle occasionally is associated with tissue destruction and repair. The histomorphological and immunohistochemical properties of regenerative muscle cells make the diagnosis challenging in those cases. Colella et al. demonstrated that

endometriosis-associated skeletal muscle regeneration posed a diagnostic dilemma [7]. Limited number of articles documented endometriosis-associated skeletal muscle change. In this article, we are demonstrating florid regenerative muscle changes mimicking neoplasm. We present the histomorphology, immunohistochemistry, and electron microscopy of endometriosis associated regenerative muscle cells and some helpful features to distinguish it from other potential differentials.

2. Case Presentation

A 36-year-old female presented with an anterior abdominal wall mass, present for last six months. She experienced intermittent pain and recent enlargement of the mass. She had a history of uterine rupture status post hysterectomy 15 years ago. Ultrasonography demonstrated bilateral adnexal masses. She has no history of cancer and denied any recent unintentional weight loss. Core needle biopsy was performed of the abdominal mass which was indeterminate due to scant amount of tissue retrieved. Due to persistent symptoms and suspicion of neoplasm, resection of the mass was done

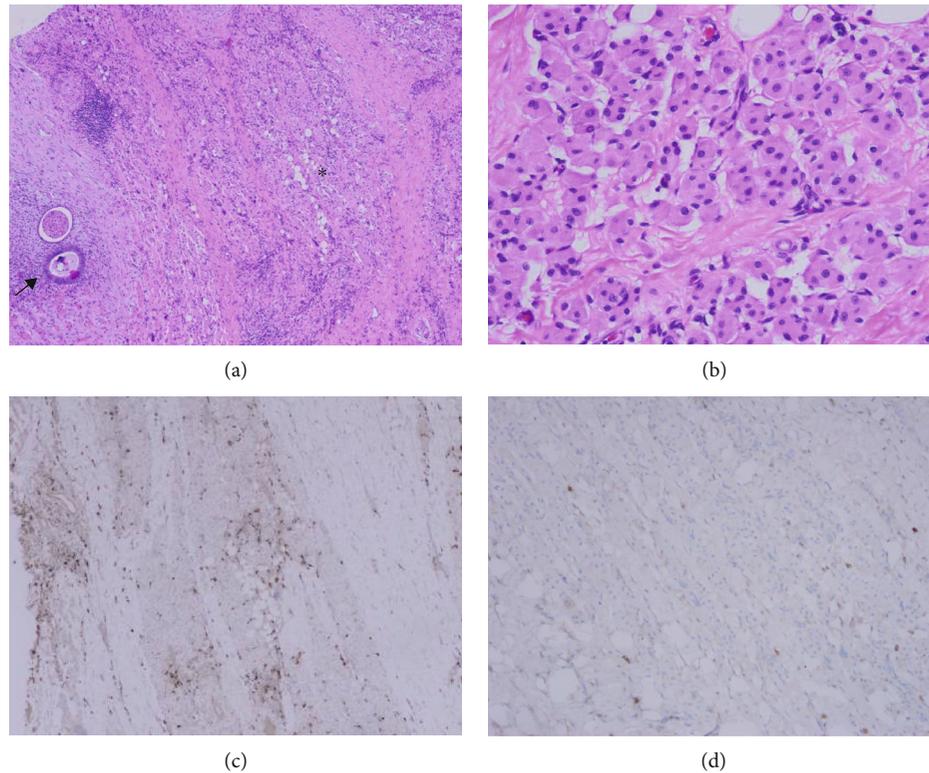


FIGURE 1: (a) Endometrial glands and stroma on the left (arrow) and multiple groups of small polygonal cells intervening the mass (*) are demonstrated. (b) The cells are round to polygonal with distinct cell border and round single to multiple nuclei. (c, d) Those cells are negative with CD68 and Pax8 antibody, respectively.

followed by reconstruction with mesh. The mass measured $8 \times 7 \times 3$ cm and weighted 150 grams. Sectioning revealed a stellate-shaped tan-white lesion grossly infiltrating the skeletal muscle and adipose tissue. Representative sections were examined under a microscope. Immunohistochemical stains were performed with AE1/AE3, CD68, EMA, MART-1, S100, inhibin, PAX8, calretinin, vimentin, myogenin, and muscle-specific actin with a VENTANA automated stainer. A reticulin stain was also performed. Appropriate controls were used for each stain. Light microscopy pictures were taken with a Lumera Infinity3 camera. Electron microscopy (EM) was performed in our facility with a JEOL electron microscope.

Hematoxylin and eosin (HE) stain reveals multiple foci of endometrial glands, stroma, macrophages, and lymphocytes. Besides that, multiple groups of small polygonal pink cells are intervening in between skeletal muscles which are strikingly different from those of surrounding macrophages and skeletal muscles. These cells are round to oval with distinct cell borders and have low nuclear to cytoplasmic ratio. The nucleus is round, single, or multiple and centrally located (Figures 1(a) and 1(b)). Immunohistochemistry with CD68 and PAX8 are negative (Figures 1(c) and 1(d), respectively). Figure 2 demonstrates that the cells are strongly positive with CD56 and S100. The well-differentiated skeletal muscles are negative with both CD56 and S100 as shown in the inbox (Figures 2(a) and 2(b)). Actin shows mild positivity in those small cells which are shown with black arrows, and stronger

expression of actin is noted in nearby differentiated muscle cells (Figure 2(c)). Myogenin shows focal cytoplasmic staining without any nuclear positivity (Figure 2(d)). Vimentin demonstrates membranous positivity, and no cytoplasmic positivity is noted in those cells (Figure 2(e)). The reticulin stain demonstrated a strong pericellular stain in the differentiated skeletal muscle as shown in the inbox; however, the small cells lack the staining pattern (Figure 2(f)). Figures 3(a) and 3(b) demonstrate the EM pictures of those small cells with cytoplasmic myofibrils.

3. Discussion

Our patient has bilateral adnexal masses and is now presenting with an enlarging abdominal wall mass which is clinically suspicious for neoplasm, metastatic carcinoma, or endometriosis. Grossly, the lesion was infiltrative through the muscle and adipose tissue which can be seen in both neoplasm and endometriosis. Microscopically, multiple endometrial glands were present suggesting endometriosis. However, the infiltrating groups of polygonal cells were a dilemma. Macrophages and other inflammatory cells are observed around the ectopic endometrial tissue. But the suspicious cells were different than histiocytes and were negative for CD68. Cells are arranged in groups, round to polygonal with a smooth distinct cell border. The nuclei are small round, single, or multiple. Our differential diagnoses were granular cell tumor, steroid cell tumor, luteinized granulosa cell tumor, oxyphilic

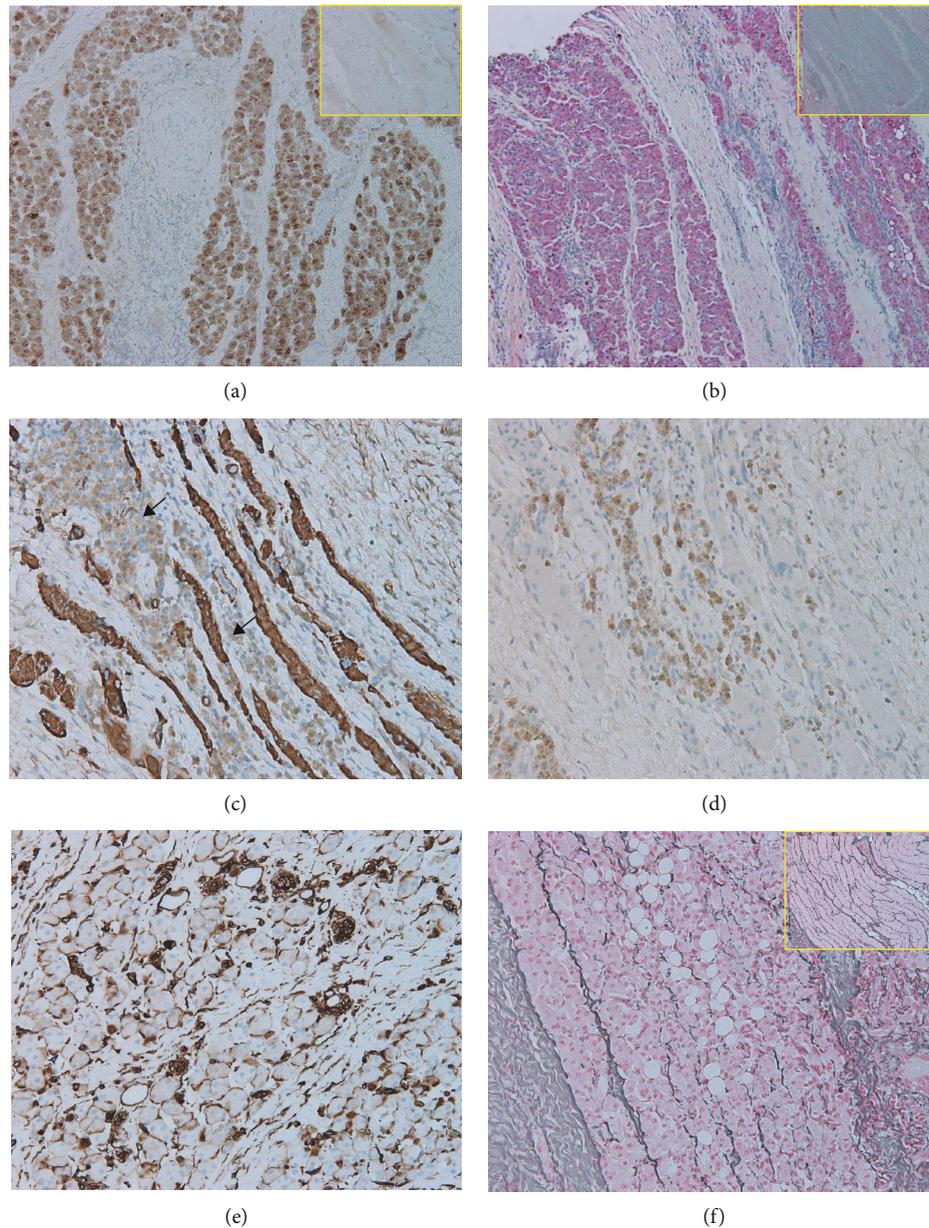


FIGURE 2: The immunohistochemical property of the cell groups is demonstrated: (a) CD56 is strongly positive, and there is progressive loss of CD56 in the differentiated muscle cells (inbox); (b) S100 detected with red chromogen which is strongly expressed in those small cell groups, and progressive loss of S100 is noted in the differentiated skeletal muscle (inbox); (c) actin is mildly positive in those cells (arrows) and strongly positive in nearby intermediate to well-differentiated muscle cells; (d) myogenin shows few cytoplasmic positivity to negative stain; (e) no strong cytoplasmic positivity is noted with vimentin; (f) reticulin stain shows no pericellular stain which is evident in well-differentiated skeletal muscle (inbox).

variant of clear cell tumor of ovary, and degenerated muscle cells. The granular cell tumor is reported at the anterior abdominal wall with granular cytoplasm and diffuse positivity with S100 and CD68 [8]. The cytoplasm of our cells is pink, but not granular, strongly positive with S100, and negative with CD68. Calretinin and EMA are also negative in these cells which are sometimes positive with a granular cell tumor. AE1/AE3, MART-1, PAX8, inhibin, and calretinin were negative in these cells which ruled out other potential differentials. No mitosis or necrosis was noted,

and cells had low nuclear to cytoplasmic ratio which prompted consideration of a benign entity such as regenerative muscle cells.

Muscle cells undergo a regenerative process following injury [7, 9]. The myoblast differentiates to intermediate and fully differentiated skeletal muscle. Each stage has distinct histomorphology and immunohistochemical properties. The less differentiated muscle cells react with CD56, S100, vimentin (strong cytoplasmic), desmin, myogenin, and myo-D1 but not with myoglobin or p21. Intermediately,

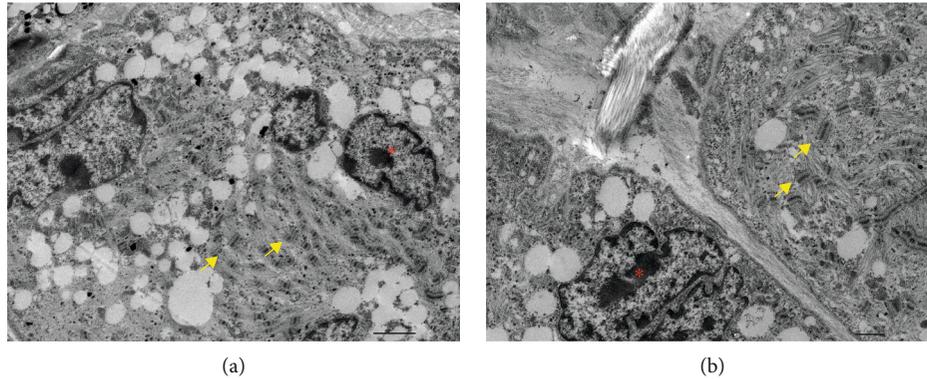


FIGURE 3: (a, b) Electron microscopy of those small cells reveals multiple nuclei with prominent nucleoli (red asterisks) and myofibrils (yellow arrows). Scale bar is 2 μ M and 1 μ M for (a, b), respectively.

differentiated cells progressively lose vimentin, CD56, and myo-D1, whereas they are positive with S100, myogenin, myoglobin, and p21. Terminally differentiated cells react with desmin and myoglobin [7]. In our case, skeletal muscles close to the ectopic endometrial tissue demonstrated a regenerative process. These cells express CD56 and S100 strongly and focally positive with myogenin and do not have the cytoplasmic positivity with vimentin (Figure 2). Electron microscopy demonstrated abundant small myofibrils in the cytoplasm. Myofibrils are short, haphazardly arranged, and are not arranged as long filaments yet. Multiple euchromatic nuclei with prominent nucleoli were observed. These features are usually seen in regenerative muscle cells at the early stage of their differentiation [10]. These groups of small cells are early to intermediately differentiated skeletal muscle cells as demonstrated by histomorphology, immunohistochemical pattern, and ultrastructure analysis. Terminally differentiated muscle cells were located away from the endometrial tissue and demonstrate progressive loss of CD56 and S100 expression (Figure 2).

Our study together with previous report highlights the importance of understanding the histology and immunohistochemistry of regenerative muscle cells. The regenerative changes can be focal or can be florid [7]. The latter is true in our case. Endometriosis associated regenerative myoblast proliferation is rare. We have encountered 18 cases of endometriosis at the abdominal wall location in our institution in the last five years. And only one case demonstrated florid regenerative muscle groups. Because of its rarity and confusing immunohistochemical property, this could be a potential diagnostic pitfall. Clinical history is helpful in most of the cases. Abdominal wall endometriosis sometimes occurs after a cesarean section or pelvic surgery, and it has an incidence of 0.03%-1.5% in women with previous cesarean delivery [1]. Endometriosis should be considered when women present with intermittent or cyclic abdominal pain. Our patient's history of ruptured uterus, bilateral adnexal mass, and intermittent pain at the abdominal mass fits with symptoms of endometriosis.

In conclusion, endometriosis associated regeneration of muscle cells can be florid and mimic neoplastic cells morphologically and immunohistochemically. Electron microscopy is helpful in challenging cases.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

References

- [1] C. Saliba, H. Jaafoury, M. El Hajj, G. Nicolas, and H. H. Ahmad, "Abdominal wall endometriosis: a case report," *Current*, vol. 11, no. 2, 2019.
- [2] H. Karaman, F. Bulut, and A. Ozasalamaci, "Endometriosis externa within the rectus abdominis muscle," *Turkish Journal of Surgery/Ulusal cerrahi dergisi*, vol. 30, no. 3, pp. 165–168, 2014.
- [3] M. Anand and S. D. Deshmukh, "Massive abdominal wall endometriosis masquerading as desmoid tumor," *Journal of cutaneous and aesthetic surgery*, vol. 4, pp. 141–143, 2011.
- [4] H. Bektas, Y. Bilsel, Y. s. Sari et al., "Abdominal wall endometrioma; a 10-year experience and brief review of the literature," *Journal of Surgical Research*, vol. 164, 2010.
- [5] K. Vagholkar and S. Vagholkar, "Abdominal wall endometrioma: a diagnostic enigma—a case report and review of the literature," *Case report in Obstetrics and Gynecology*, vol. 2019, pp. 1–4, 2019.
- [6] A. Kocakusak, E. Arpinar, S. Arikan, N. Demirbag, A. Tarlaci, and C. Kabaca, "Abdominal wall endometriosis: a diagnostic dilemma for surgeons," *Medical Principles and Practice*, vol. 14, no. 6, pp. 434–437, 2005.
- [7] R. Colella, M. G. Mameli, G. Bellezza, R. Del Sordo, A. Cavaliere, and A. Sidoni, "Endometriosis-associated skeletal muscle regeneration: a hitherto undescribed entity and a potential diagnostic pitfall," *The American journal of surgical pathology*, vol. 34, 2010.
- [8] J. Lee, N. W. McGhan, S. W. Young, J. M. Collins, and A. E. McCullough, "Granular cell tumor of anterior abdominal wall," *Radiology Case Reports*, vol. 7, no. 3, p. 716, 2012.
- [9] S. Bodin-Fowler, "Skeletal muscle regeneration after injury: an overview," *Journal of voice*, vol. 8, no. 1, pp. 53–62, 1994.
- [10] C. A. Sewry, "Electron microscopy of human skeletal muscle: role in diagnosis," *Current Diagnostic Pathology*, vol. 8, no. 4, pp. 225–231, 2002.