

Three Cases of Immature Teratoma Diagnosed after Laparoscopic Operation

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ABSTRACT: While mature cystic teratoma of the ovary is the most common ovarian tumor in young women, immature teratoma is a very rare tumor, representing only 1% of all ovarian cancers. In the three cases presented here, young women who were suspected to have mature cystic teratoma, based on CT scan and MRI, were ultimately diagnosed with immature teratoma Ic (b) G1 after laparoscopic operation. They underwent salpingo-oophorectomy of the affected side only and have shown no sign of recurrence during follow-up. We sometimes encounter patients with immature teratoma who have no findings pointing to malignancy on CT or MRI. Generally, if the components of immature nerve cells that represent immature teratoma are very few, it is difficult to diagnose the entity as immature teratoma with imaging evaluations such as CT or MRI. In many hospitals, laparoscopic surgery is selected for patients with ovarian mature teratoma. Therefore, it is essential to attempt as much as possible not to disseminate the fluid content of the tumor into the intra-abdominal space during laparoscopic operation, because in rare cases the tumor turns out not to be benign mature teratoma.

KEYWORDS: mature teratoma, immature teratoma, laparoscopic surgery

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Introduction

Immature teratoma of the ovary is a rare tumor, representing 1–3% of all germ cell tumors and 20% of malignant ovarian germ cell tumors. It is more common in younger patients. Additionally, laparoscopic surgery is generally selected as the operative procedure for patients with mature teratomas in many hospitals. However, the pathological diagnosis of the excised tumor is what finally determines whether an ovarian tumor is a mature or immature teratoma. Unfortunately, if the tumor is not benign, the laparoscopic surgery can advance the disease stage.

We report three cases of ovarian tumor with pathological diagnoses of immature teratoma Ic (b) G1, despite pre-operative diagnoses of mature cystic teratoma by CT scan and MRI.

Case Reports

Case 1. The patient was a 26-year-old Japanese woman, gravida 0, parity 0, who had no remarkable medical or family

history. She had been diagnosed with ovarian tumor at another hospital and introduced to our hospital for treatment by laparoscopic operation. The size of tumor was 48 × 52 mm, with no solid components to suggest malignancy on the CT scan or MRI (Fig. 1). Tumor markers such as CA125, CA19–9, alfa-feto protein (AFP), and squamous cell carcinoma (SCC) were within the normal range. Therefore, we clinically diagnosed ovarian benign tumor and chose laparoscopic surgery as the operation procedure. The macroscopic finding of the tumor did not contradict the diagnosis of mature cystic teratoma (Fig. 2).

However, the final pathological diagnosis was, unexpectedly, immature teratoma G1 (Fig. 3). We obtained informed consent from the patient and her family to plan a laparoscopic salpingo-oophorectomy and performed the operation. As there were no findings of residual tumor in the peritoneum, omentum, or the other ovary, we removed only the affected ovary (Fig. 4). We did not pathologically detect any residual

MRI findings of case 1

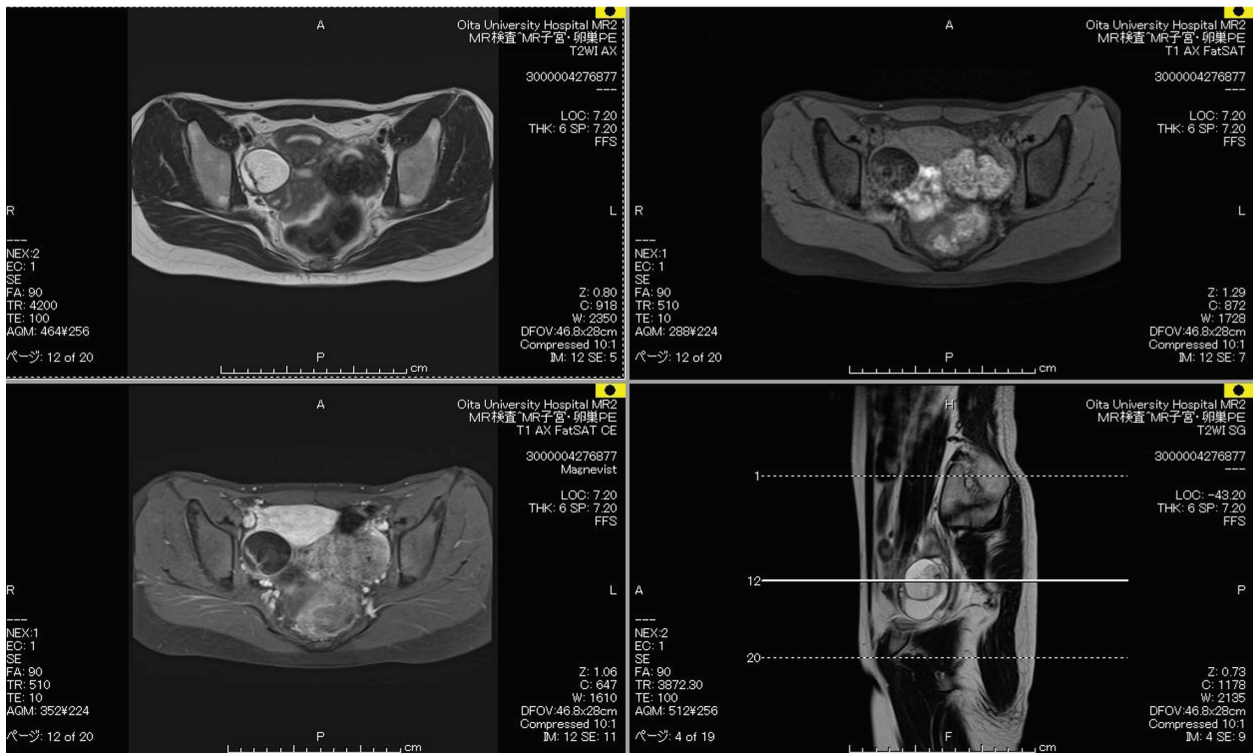


Figure 1. A 5.2-cm right ovarian tumor is shown. This ovarian tumor is indicated by high signal intensity on T1-weighted images, and low to iso-intensity signal on T2-weighted images. Moreover, fatty elements were identified on fat-saturated T1-weighted images.

tumor components of the immature teratoma in the removed ovary. We chose not to perform maintenance chemotherapy after the operation for this immature teratoma.

Case 2. The patient was a 19-year-old Japanese woman, gravida 0, parity 0, who had no remarkable medical or family history. She consulted a doctor because of a common cold, and a left ovarian tumor measuring 55 × 66 mm was ultimately discovered by ultrasound sonography. She was introduced to our hospital for treatment by laparoscopic operation. As in

case 1, there were no solid components indicating malignancy in the CT scan or MRI and no elevation of tumor markers including CA125, CA19-9, AFP, and SCC. She underwent laparoscopic ovarian cystectomy, and the pathological diagnosis after that operation was immature teratoma G1. Therefore, we performed a re-operation, laparoscopic salpingo-oophorectomy. No residual components of the immature teratoma were found in the removed ovary, and she was carefully monitored without additional treatment.

Case 3. The patient was a 31-year-old Japanese woman, gravida 0, parity 0. She consulted a doctor regarding prolonged menstruation, and an ovarian tumor of 62 × 58 mm was discovered. Because no solid components indicating malignancy were found, the tumor was diagnosed as a mature cystic teratoma. Tumor markers including CA125, CA19-9, AFP, and SCC were in the normal range. As with the patients in cases 1 and 2, this patient underwent laparoscopic ovarian cystectomy. However, the final pathological diagnosis was immature teratoma G1, and we performed salpingo-oophorectomy. The diagnosis was immature teratoma Ic (b) G1, and she has been attentively followed up at our hospital without recurrence.

We were able to perform cystectomy without rupture in all three cases. We placed a bag called Endo Catch (Covidien, Dublin, Ireland) in the abdomen to prevent the dissemination of the tumor and to contain the tumor during removal. In

The macro finding of case 1

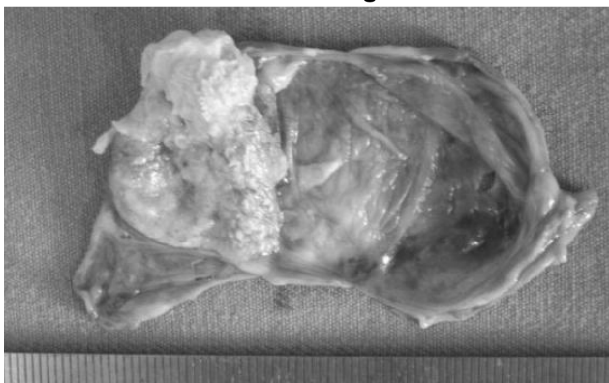


Figure 2. The macro findings of this tumor resembled those of mature cystic teratoma, including some fat tissue, hair, skin, and bone. It was difficult to diagnose the tumor as immature teratoma by macroscopic findings alone.

The pathological findings of case 1

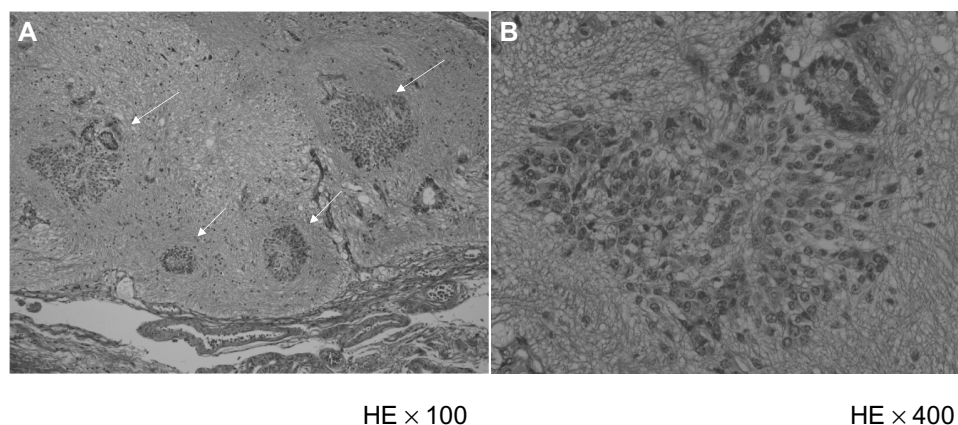


Figure 3. Nests of immature nerve cells suggestive of immature teratoma were found in the histological analysis.

all three cases, the cytology of peritoneal fluid in the second operation was negative.

Discussion

Immature teratoma was first described by Thürlbeck and Scully in 1960, and can be pure or mixed with a mature component.¹ Most mature cystic teratomas are not so difficult to diagnose using CT scan and MRI. Generally, if the CT scan shows a low-density area representing the fatty constituent and a high-density area representing the bone constituent, we can distinguish benign teratoma from other ovarian tumors. It is reported that a fat component is detected in 93% of mature cystic teratomas and in 56% of bone or other calcifications.² On the other hand, the sebaceous components of a teratoma have a moderate to very high signal intensity on T1- and T2-weighted MRI scans. Moreover,

fat suppression by fat saturation of T1-weighted images is available for diagnosis.³

Immature teratomas generally affect younger patients, and are much less common than mature cystic teratomas, representing just 1–3% of ovarian teratomas. Clinically, they behave as malignancies. Histologically, immature cystic teratoma is distinguished by the presence of embryonic tissues.⁴ Other characteristics of the immature teratoma are believed to be similar to those of mature cystic teratoma. On radiograph, immature teratomas are typically larger (14–25 cm) than mature cystic teratomas.^{5,6} In addition, they may have a prominent solid component in the cystic elements.^{7,8} However, the radiographic findings of immature cystic teratomas are similar to those of mature cystic teratomas. Yamaoka et al reported that there are aqueous fluids and solid components consisting of numerous cysts with punctate foci of adipose tissue. They reported that the correlation coefficient between the amount of solid tissue and the tumor grade was not significant, even if the tumor pathological grading is based on the amount of embryonic nerve tissue present.⁹

As in our experience, there are other reported cases with pathological results of immature teratoma where malignancy was not indicated on pre-operative CT scan and MRI.^{8,10,11} In the cases presented here, nothing on the CT or MRI indicated immature teratoma before the pathological diagnosis of the removed tumor, and the patients were only diagnosed with immature teratoma G1 after the laparoscopic operation and analysis of the specimen tissue.

The 5-year survival rate of immature teratoma stage I is 90–95%, whereas advanced-stage survival drops to about 50% in Grade 1 to 2 cancer, and to 25% or less in G3 tumors. Mann et al reported about the prognosis for 124 cases of immature teratoma.¹² They found that the 5-year overall survival rate for patients with immature teratoma of stage I and G1 was 98.5% if they underwent cystectomy without residual tumor. Norris et al reported that the rate of recurrence of immature teratoma was 18% in G1, 37% in G2, and 70% in G3, but the 5-year

The finding of secondary operation of case 1



Figure 4. No disseminated tumors were detected in the pelvic cavity, uterus, or adnexa after the first operation. The patient underwent salpingo-oophorectomy of the affected side.



overall survival of patients with stage I and G1 tumors was 100% in 14 cases.¹³ Generally, immature teratoma patients of stage I and G1 are treated with surgery alone, because the prognosis is good. If the grade advances to 2 or 3 or the stage goes beyond Ia, chemotherapy is usually recommended.¹⁴ The present cases were all Ic (b) because the tumor capsule was cut during laparoscopic surgery. According to the Japanese guidelines for ovarian cancer, immature teratomas of stage I and G1 do not need additional chemotherapy. Therefore, the patients have been carefully followed, for 24 months in case 1, 36 months in case 2, and 38 months in case 3. There has been no recurrence. We expect that the prognosis of the cases is good because no residual tumor could be detected in the pelvic cavity.

In summary, the ovarian teratoma affects primarily younger patients, and laparoscopic surgery is mainly selected as the operative method. Therefore, it is important to pay special attention to the possibility of disseminating malignant cells into the abdomen, in case the tumor turns out to be malignant. For example, by aspirating the content fluid of the tumor first and then picking up the tumor using a bag such as Endo Catch, the risk of disseminating the tumor into the abdomen during laparoscopic surgery is minimized. The patients wanted to maintain their potential fertility; hence, we removed the ovary on the affected side caused by the immature teratoma in the second laparoscopic surgery. We did not perform maintenance chemotherapy. Since ovarian teratoma is one of the most common ovarian tumors, we must always consider the possibility that any ovarian tumor we operate on may not be benign.

Author Contributions

Conceived the concepts: MN, YK, AY, KN, HM, HN. Analyzed the data: MN, YK, AY, KN, HM, HN. Wrote the first draft of the manuscript: MN, YK, AY, KN, HM, HN.

Contributed to the writing of the manuscript: MN, YK, AY, KN, HM, HN. Agree with manuscript results and conclusions: MN, YK, AY, KN, HM, HN. Jointly developed the structure and arguments for the paper: MN, YK, AY, KN, HM, HN. Made critical revisions and approved final version: MN, YK, AY, KN, HM, HN. All authors reviewed and approved of the final manuscript.

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