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Case Study

An ovarian teratoma of late Roman age

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ABSTRACT

We report here a very unusual pelvic calcification recovered from the remains of a 30-40-year-old woman found at the late Roman period archeological site of La Fogonussa (Lleida, Catalonia). Although differential diagnoses for calcifications of the pelvis are complicated in archeological contexts, the precise localization, macroscopic features, and the presence of teeth along with part of a small bone led us to identify this case as an ovarian teratoma, based upon gross observations and computerized tomography (CT).

1. Introduction

During 2010, 46 burials were exhumed from the archeological site of La Fogonussa (Catalonia, Spain), a 5th century B.C. necropolis during the decline of the Roman Empire in the Iberian Peninsula (Beta 305216, Cal BP 1540–1400). Skeleton number 87 (UE 3125), complete, well preserved, and lying in supine position, was exhumed from a stone grave (Fig. 1). A round, small calcified mass was encountered in the pelvic region, near the ischial spine of right os coxa (Fig. 2).

Such rare paleopathological evidence may often go unnoticed during archeological excavations. Calcifications from the abdominal and pelvic cavities can be confused with ordinary stones and thus discarded. Therefore, few abdominal calcifications have been reported in the paleopathological literature. Nevertheless, in this case the characteristics and size of the round mass were clearly recognizable as being of organic origin.

Differential diagnosis of pelvic calcifications from archeological contexts is complicated (Steinbock, 1989). Several potential intra-abdominal organic concretions should be considered in differential diagnosis, including gallstones, renal stones, bladder stones, diverticular stones, uterine leiomyomas, ovarian calcifications, phleboliths, coproliths, calcified lymph nodes, and teratomas (Isidro et al., 2005).

2. Materials and methods

Skeleton 87 represents a female 30-40-year-old at the time of death, based upon morphological changes of the iliac auricular surface (Lovejoy et al., 1985) and Todd' s criteria for the pubic symphyses (Krogman and Iscan, 1986). Sex estimation emphasized dimorphic morphological characteristics of the bony pelvis (Ferembach et al., 1980). Degenerative lesions were noted in several parts of the postcranial skeleton. These included bilateral moderate osteoarthritis in the shoulder, wrist, hip, and knee, and large osteophytes in the cervical and lumbar regions of the spine. Nevertheless, the most significant paleopathological condition was the presence of the round calcified mass in the pelvic region.

Differential diagnosis for the abdominal mass included features visible through gross examination and CT imaging. Steinbock's criteria (Steinbock, 1989) were also considered. The CT scan was performed in a Philips Brilliance 6 at 0.6 mm of thickness and IAC windowing [(C1350/W1 1500)].

3. Results

The calcified mass was spherical and had a rugose surface of the same color and texture as the bones. It measured 42.72 mm in

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Fig. 1. Burial of individual 87 from the late Roman site of La Fogonussa (Catalonia, Spain). The structure of the grave was made of *tegulae* placed to form a *gabled* roof.

length and 44.27 mm at its maximum diameter. After careful cleaning, it was apparent that this was a delicate structure, largely empty as encountered archeologically. Its spherical shape was incomplete and there was an external protuberance (Fig. 3). The inner sediment contained two deformed partial teeth and a small piece of thin bone. A detailed internal examination of the calcified structure showed a protuberance with two additional teeth attached (Fig. 4).

The CT scan of the specimen shows two differentiated parts, an external wall and an internal space (Fig. 5.). The external part corresponds to a rare calcification (in life) of the capsule, which

Fig. 2. Close-up of the pelvic region of Skeleton 87 from la Fogonussa. The arrow points to the calcified mass beside the ischial spine of the right os coxae.

Fig. 3. Macroscopic image of the calcified mass, which has a spherical shape and a external protuberance.

presents a thickness between 3.2 mm and 1.06 mm. The capsule has an irregular surface and almost spherical shape. Small perforations distributed across the surface could be post-depositional artifacts. Inside the cavity, there is a bone formation that rises directly from the inner wall of the calcified capsule. Several calcified septa that housed teeth and bone can be observed in the CT image.

Differential diagnosis of archeologically recovered pelvic calcifications is a complicated matter, as they are rarely reported (Komar and Buikstra, 2003; Isidro et al., 2005). Such calcifications are classified clinically into five types, based upon morphological and radiological appearance: benign tumors, neoplasms, infections, vascular calcifications and other causes. Within the types occur a number of different, relatively rare conditions, including:

1. Benign tumors: (a) ovarian: papillary cystadenoma or pseudomucinous, fibroma, gonadoblastoma, dermoid cyst or teratoma, (b) uterine: leiomyoma, and (c) spine: chordoma.
2. Neoplasms (a) ovarian: cystadenocarcinoma, malignant teratoma, (b) uterine: leiomyosarcoma, (c) digestive tract: colloid carcinoma of the colon, appendiceal mucinous adenocarcinoma, and (d) spine: malignant sacral tumors.
3. Infections with calcification of lymph nodes, tuberculosis of the bladder, ureter or tubes, tubal calculations and parasites.
4. Vascular: phleboliths, arterial calcifications, arteriovenous malformations or diffuse arterial calcification of the uterus.
5. Other (a) gynecological: foreign body, (b) obstetric: pregnancy, lithopedion, placental calcifications, (c) urine: lithiasis of the lower urinary tract, and (d) digestive: enterolith, biliary ileus, mucocele, appendiceal mixoglobulosis, appendicolith, calculation of the Meckel's diverticulum (Stein, 1982; Moral Pascual et al., 2007).

All the potential etiologies except one were excluded in this case due to the diagnostic features of the specimen, including localization in one side of the true pelvis, spherical shape with an internal protuberance, and presence of calcified structures such as bone

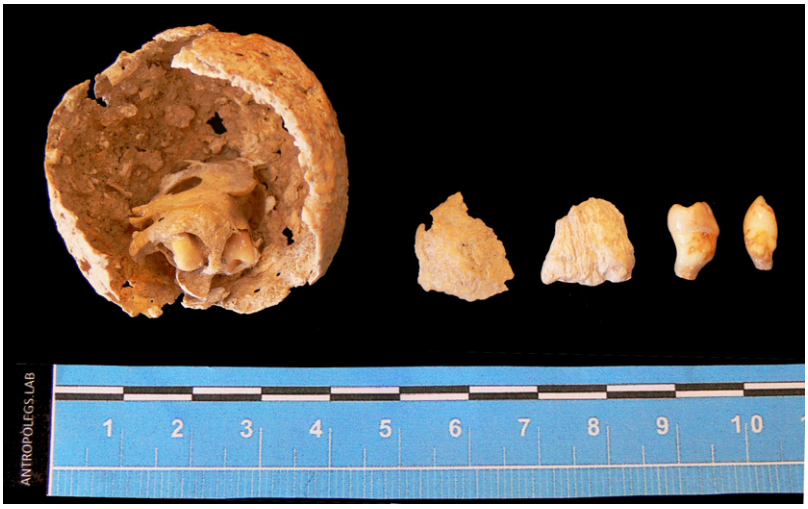

Fig. 4. Macroscopic view of the inner protuberance with two teeth attached.

and teeth. These features are pathognomonic characteristics of an ovarian teratoma.

4. Discussion

Ovarian teratomas are benign tumors of unpredictable shape, usually characterized as being eccentric and bizarre. The term "teratoma" is derived from the Greek *teras*, meaning monster and *onkoma* meaning swelling, which Virchow coined in the first edition of his book on tumors, published in 1863 (Pantoja et al., 1975). The condition was also termed a dermoid cyst in 1831 by Leblanc (Comerci et al., 1994).

Mature cystic teratomas account for 10–20% of benign ovarian cysts (Lipson and Hricak, 1996). They may occur in women during child-bearing years, and they are usually unilateral, with a bilaterality rate of only 10.8% (Comerci et al., 1994; Kim et al., 2011). Most contain derivatives of all three germ layers, such as hair, teeth, bone, rudiments of thyroid gland, etc. In some cases there are de novo developments of teeth in a teratoma (Ounjian and Mani, 1980).

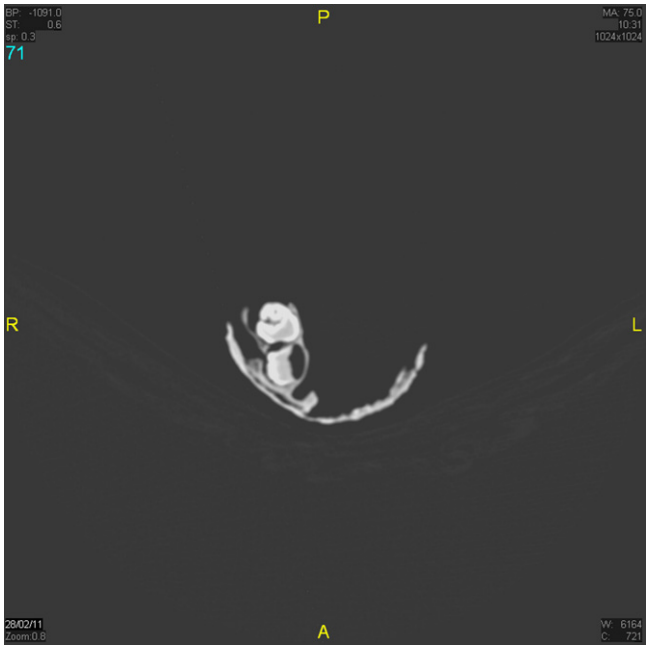

Fig. 5. CT scan image (0.3 mm) confirming the presence of complete teeth and several calcified septa.

The most common dimensions range between 5 and 15 cm in diameter, but some reach 45 cm. Clinical symptoms of teratomas are rare and patients are asymptomatic in 60% of cases, based upon a study in 517 cases of mature cystic teratoma during a 14-year study period at the Department of Obstetrics and Gynecology, Albert Einstein College of Medicine, Bronx, New York (Comerci et al., 1994).

This ovarian teratoma could have been the cause of this woman's death because sometimes the development of teratomas results in displacement and functional disturbances of adjacent organs (Tandon et al., 2010). They can be associated with infection (Wolski and Jasinski, 1981) and hemolytic anemia (Glorieux et al., 1998). Pregnancy seems to favor the development of some complications, and occasionally the teratoma itself may cause obstruction during labor (Maslin et al., 2002; Sloan, 1963).

The presence of an ovarian teratoma in a skeleton from the late Roman period is a significant discovery because there are no references to such cases in the paleopathological literature. To date, there have appeared only one report of an ancient mediastinic teratoma (Charlier et al., 2009) and one case of a lithopedion (Rothschild et al., 1993). This may be due to the low incidence of such tumors, which could explain the apparent low archeological visibility. In addition, calcification of the external wall of the teratoma is atypical, and therefore the extreme fragility of this outer layer severely limits preservation potential in most archeological contexts.

5. Conclusion

There are few cases of abdominal calcifications in paleopathology, and intra-abdominal diagnoses of calcified concretions are complex. However, the specific features of this case, including the presence of teeth, are absolutely diagnostic of an ovarian teratoma. The case presented here is the first published example of an ancient ovarian teratoma.

The calcification and preservation of the external wall of this teratoma is exceptional. In general, only inner structures of teratoma become calcified, while the external tissues of teratomas is hardly ever calcified (Pantoja et al., 1977).

In archeological contexts this condition can be misinterpreted as isolated teeth, hair, and bones, resulting from archeological mixing.

Therefore, this is an extraordinary case, not only for its antiquity, but also its identification in the archeological record.

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