

Case series on granulosa cell tumor in cattle with practical hints on diagnostics and outcome

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Background

Granulosa cell tumors are the most common neoplasms of the bovine ovary and affected animals show a wide range of clinical signs.

Material and Methods

This case series comprises five cases of ovarian granulosa cell tumors in cattle. The affected animals had different breeds and ranged in age from 1 year 4 months to 20 years 11 months. The cases were subjected to various diagnostic and therapeutic measures (Tab. 1).

Results

Anti-mullerian hormone (AMH) was measured in one of the affected animals (case 1) and was markedly elevated (>150 pmol/l; reference value <3 pmol/l). Three animals (cases 3-5) underwent standing laparotomy with unilateral ovariectomy, of which one ovary had a diameter of 40x50x60 cm (case 5, Fig. 3). The remaining two animals were slaughtered. In one animal (case 1), the tumor showed infiltrative growth and metastases were observed, which confirms the previous reports that malignancy or metastasis is possible in cattle¹. Another case (animal 4) shows that surgical treatment can subsequently lead to a resumption of reproduction.

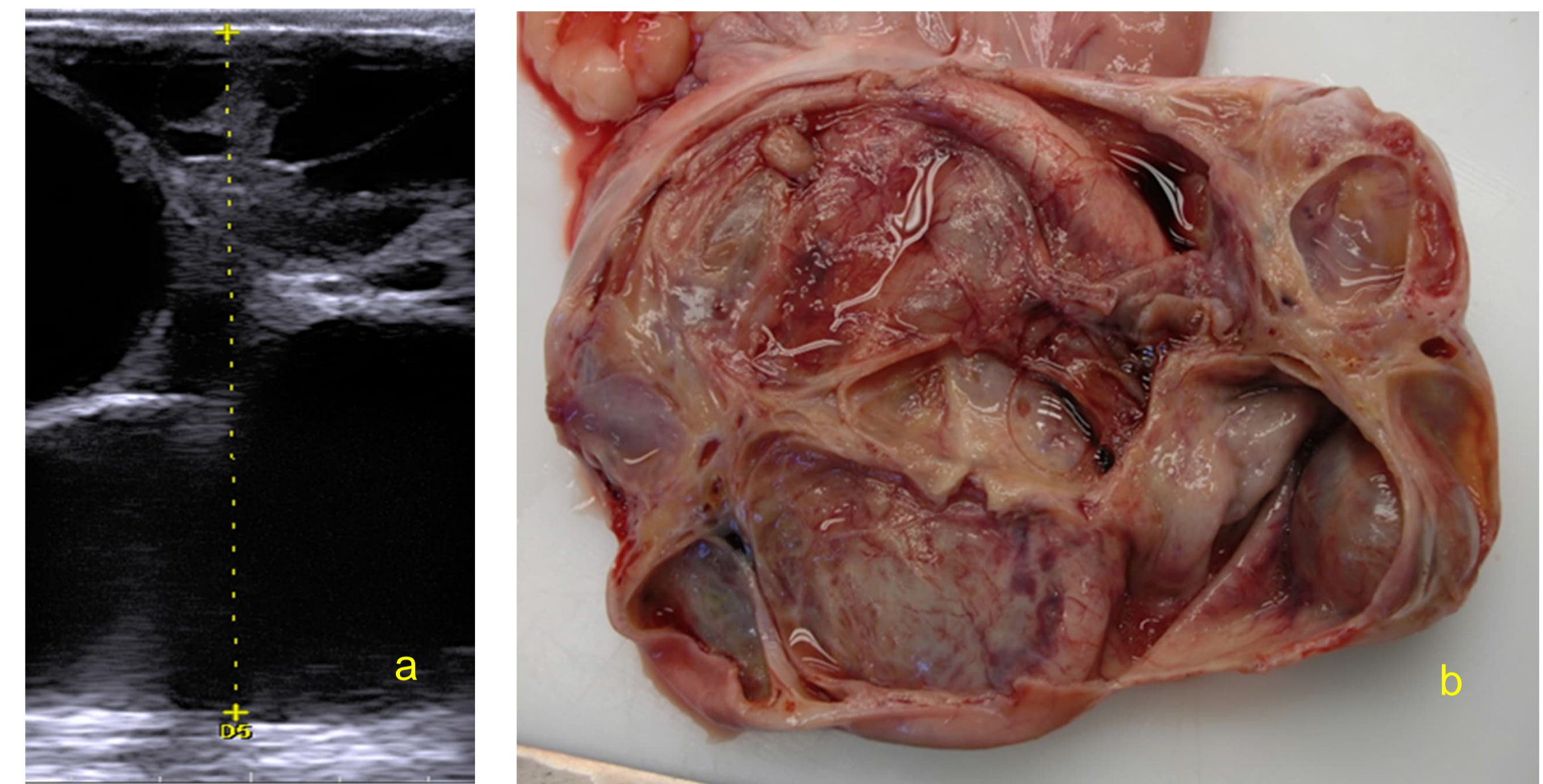


Fig. 1 Case 2, right ovary; a: Sonographic image, diameter (yellow, broken line) 12.7 cm; b: After slaughter, gross pathology, granulosa cell tumor incised, severely enlarged ovary (diameter 18 cm) interspersed with multiple, thin-walled, variably sized, fluid-filled cysts

Tab. 1 Summary of the 5 cases

Case	Age (years), breed	General condition (GC), reason for admission	Further examinations <small>Reference values: Progesterone > 1 ng/ml luteal activity; Oestradiol in heat max. 44 pmol/l; AMH < 3 pmol/L; Testosterone > 1 ng/ml intact bull</small>	Therapy	Histopathological examination	Outcome
1	1.5 y, crossbred beef	GC: undisturbed; regular oestrus; virilization, edematization of udder and external genitals	Ultrasound both ovaries 6.5 x 4.5 x 4 cm, cavernous structure, Progesterone _{serum} 1.03 ng/ml Oestradiol _{serum} 101 pmol/l AMH _{serum} >150 pmol/l	Refused by the owner	Infiltrative, non-encapsulated, cell-dense mass (cuboidal to polygonal cells embedded in myxoid basophilic stroma); severe anisocytosis and anisokaryosis, multifocally extensive areas of necrosis and hemorrhages	Slaughter in extremis 8 months after initial examination; metastases (peritoneum and diaphragm)
2	1.3 y, Holstein Friesian	GC: undisturbed; no oestrus; virilization, edematization of udder and external genitals	Ultrasound right ovary 5 x 5 x 5 cm with cystic structures, then growth within 3 months to 18 x 14 x 12 cm with several cystic structures (Fig.1a)	Refused by the owner	Proliferation of granulosa cells, forming cords, solid nests and cystic structures	Slaughter due to increasingly "male" behavior (Fig. 1b)
3	6 y, Eringer	GC: undisturbed; rectal palpation findings: enlarged right ovary	Ultrasound right ovary 18 x 20 x 9 cm Progesterone _{serum} 0.7 ng/ml, Oestradiol _{serum} 52 pmol/ml, Testosterone _{serum} 0.4 ng/ml	Laparotomy with unilateral ovariectomy	Cystic structures surrounded by fibrovascular stroma; mild anisocytosis and anisokaryosis, moderate mitotic rate, multiple areas of hemorrhages as well as single cell necrosis	Slaughter 10 months after discharge (due to infertility)
4	6 y, Red Holstein	GC: undisturbed; rectal palpation findings: enlarged right ovary	Ultrasound left ovary, 9 x 7 x 5 cm	Laparotomy with unilateral ovariectomy	Cystic structures lined by polygonal cells with poorly delineated, eosinophilic cytoplasm, surrounded by well-formed stroma, mild anisokaryosis and cytolysis, low mitotic rate	Calving 11 months post op; 4 more births
5	21 y, Swiss Braunvieh	GC: undisturbed; ambiguous, inconclusive rectal findings, edematization of the udder	Transabdominal ultrasound of the right flank: big amorphous structure with cystic areas (Fig. 2)	Laparotomy with unilateral ovariectomy, right ovary 40 x 50 x 60 cm (Fig. 3)	Multinodular, cell-dense proliferate of cylindrical to polygonal cells, forming solid nests and cords, cystic structures surrounded by collagen-rich fibrovascular stroma, low to moderate mitotic rate (Fig. 4)	Dead 9 months post op, without previous signs of illness



Fig. 2 Case 5: Sonographic image from the right flank, amorphous structure with cystic areas

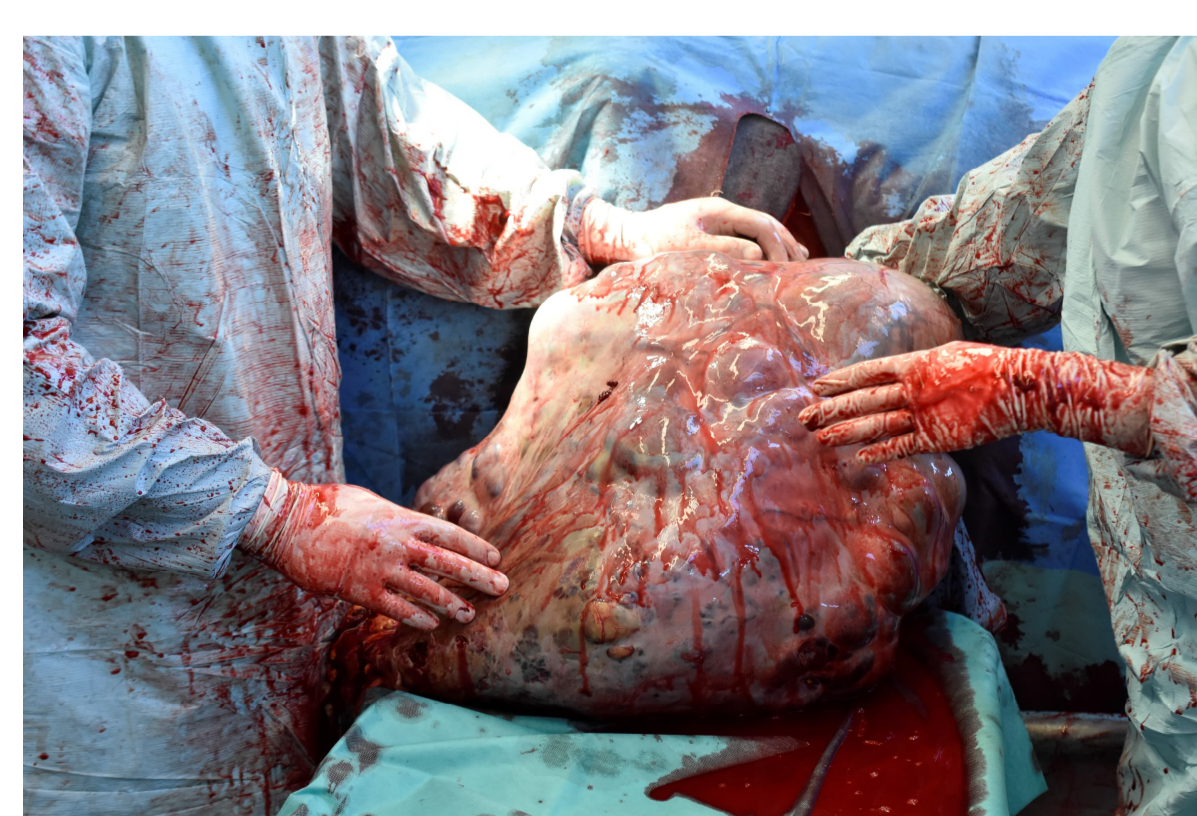


Fig. 3 Case 5: Intraoperative view, right flank, the mass after opening the abdomen and before exenteration

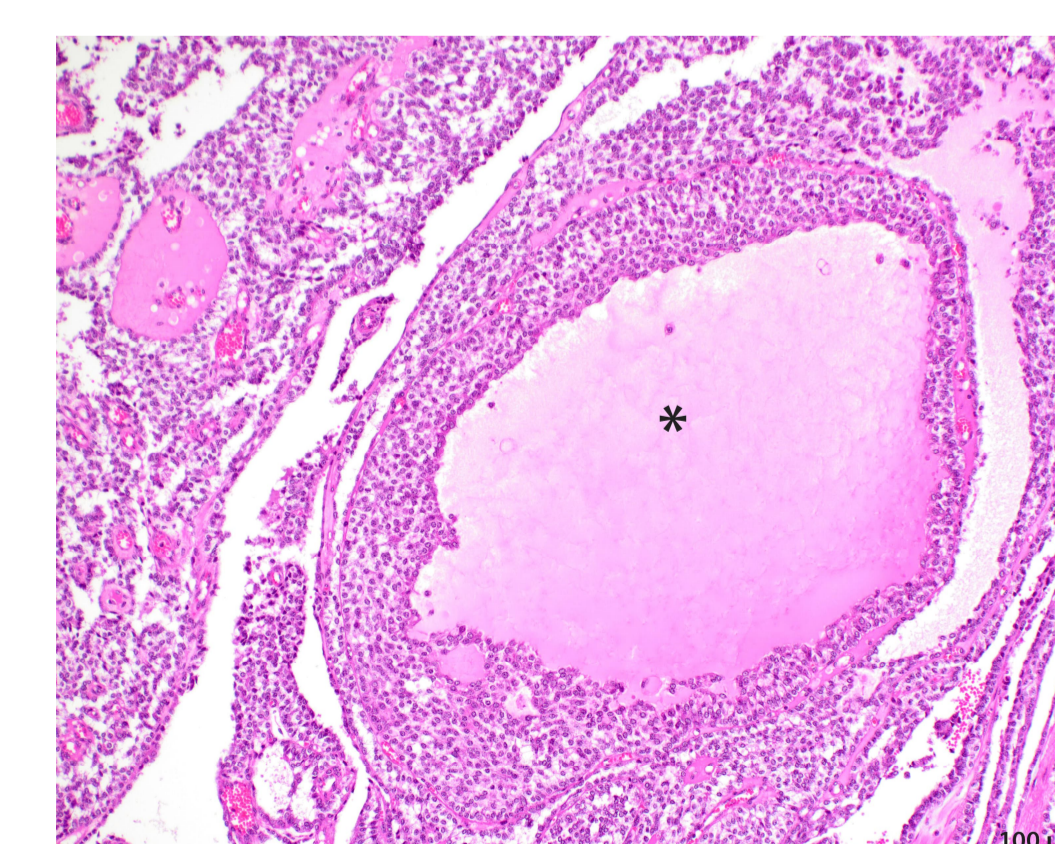


Fig. 4 Case 5: Right ovary, proliferation of granulosa cells, forming cords, solid nests and papillary structures as well as cysts (*). Hematoxylin-eosin, 10x

Conclusion

The initial tentative diagnosis of GCT can be made by ultrasound-assisted rectal examination of the genital tract and may subsequently be confirmed by evaluation of AMH levels. The resection of the altered ovary could lead to a subsequent resumption of reproductive activity and cessation of undesirable behavior.

References

¹ Trösch, Luzia Maria; Müller, K; Brosinski, Katrin; Braun, Ueli (2015). Hämoperitonium und Hämothorax bei einem Rind mit metastasierendem Granulosazelltumor. Schweizer Archiv für Tierheilkunde, 157(6):393-343.