

Haemothorax and haematuria in a Dutch Warmblood horse due to metastasised anaplastic sarcoma

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Summary: A 5-year old Dutch Warmblood gelding was presented with bilateral epistaxis, dyspnoea, a stiff gait, a reluctance to move and a wide-base stance, lethargy, anorexia and a muscular defence. Ultrasonography revealed marked pleural effusion on both left and right sides of the thorax and 7 litres of haemorrhagic fluid was drained after placement of a thoracic catheter. Cystoscopy was performed when the horse was showing haematuria several days later and the haemorrhagic fluid was seen originating from the right ureter. Subsequent ultrasonography of the kidneys revealed a mass in the right kidney, from which a tentative diagnosis of a primary tumour of the kidney with metastasis to the thorax was made. Anaplastic sarcoma in both kidneys, lungs and heart of unknown primary origin was diagnosed post mortem resulting in haemothorax and haematuria.

Keywords: haemothorax / haematuria / anaplastic sarcoma / metastasis / kidney tumour / oncology

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Introduction

Anaplastic sarcoma is a very rare tumour, described only once previously in a horse in the caudal thigh with metastasis in the lungs (Danton et al. 1992). Haemothorax in a horse due to metastasis in the lungs was reported previously in a mare with metastasised haemangiosarcoma of the left ovary (Gruys et al. 1976). This case report describes an unusual combination of a haemothorax and haematuria in a gelding caused by an anaplastic sarcoma localised in both kidneys with metastasis in heart and lungs.

Case history

A 5-year old Dutch Warmblood gelding, used for show jumping, was referred as an emergency patient to the Emmeloord equine clinic. The horse had arrived at the present owner only three weeks before and thus the previous history was unknown by the present owner. During the week before presentation at the clinic it was noticed that the horse was lethargic and had endured an episode of acute, mild bilateral epistaxis after exercise. The morning prior to referral, the horse showed bilateral epistaxis again, lethargy, stiffness, a wide-base stance, anorexia, laboured breathing, nostril flaring, scraping on the floor and a muscular defence. For this reasons the referral veterinarian suspected a peritonitis and the horse was sent to the referral clinic. Upon clinical examination the horse demonstrated a very stiff gait, was reluctant to move and had a tucked-up belly. The horse appeared mildly depressed, but was still responsive to stimuli. The heart rate was elevated (90 beats/min), mucosal membranes and capillary refill times (CRT) were within normal limits, body temperature was increased (38.6 °C), the horse expressed laboured breathing, nostril flaring and tachypnoea. Except for the tachycardia, heart auscultation was within normal limits. Auscultation of the lung fields revealed reduced respiratory sounds ventrally on both sides. Rectal examination revealed

no abnormalities. A routine blood emergency examination was performed at the clinic and the results of the haematology showed a slightly elevated white blood cell (WBC) count ($12.2 \times 10^9/l$), a mildly decreased packed cell volume (PCV) (0.32l/l), a normal blood pH (7.47) and an increased blood lactate concentration (3.02 mmol/l).

Ultrasonographic examination (Logiq E, Scil Animal Care Company Nederland, Oostelbeers, the Netherlands) of the ventral abdomen showed a minimal amount of free abdominal fluid. Several small intestinal loops were mildly distended with decreased peristalsis, and small intestine wall measurements were within normal limits. Ultrasonographic examination of the thorax was also performed. A large amount of echogenic fluid, swirling with the respiratory movement in both left and right pleural space and multiple hypoechoic masses were detected in the fluid (Fig. 1). These findings were compatible with blood containing blood clots or purulent material. The ventral parts of the lung lobes were not air filled and were decreased in size, consistent with pressure atelectasis.

Radiographic examination of the thorax was performed. The ventral part of the thorax was obscured by a soft tissue opacity with a horizontal border, compatible with pleural effusion. The dorsal lung lobes show a mixed interstitial and bronchial pattern. Cardiac silhouette could not be evaluated because of border effacement with the pleural effusion. The tentative diagnosis of pleuritis/pleuropneumonia or haemothorax was made. The horse was prepared for thoracocentesis and drainage.

For the thoracocentesis, the right side of the thorax was clipped and aseptically prepared. Skin and intercostal muscles were infiltrated with local anaesthetic (Lidocaine HCl 2%, Eurovet Animal Health BV, Bladel, The Netherlands) at the level of the 7th intercostal space as ventrally as possible, guided by ultrasonography. A small skin incision was made at the level of the 7th intercostal space located just cranial to the 8th rib. A Kocher forceps was placed in the tip of a 6.7 mm Foley

catheter of 41 cm length to facilitate blunt introduction of the catheter into the thoracic cavity along the cranial aspect of the 8th rib. Progressing of the catheter and forceps were guided ultrasonographically. Following introduction of the Foley catheter, a total volume of 7 litres of haemorrhagic fluid was passively drained into a bucket. The Foley catheter was sutured to the skin and a 10cm piece of penrose drain was fixed to the opening of the catheter to create a one-way valve system. The fluid had a Packed Cell Volume (PCV) of 0.27 l/l; venous PCV was 0.17 l/l at that time. The horse was closely monitored after the procedure. Blood transfusion was considered but not deemed necessary at the time.

Following the drainage of the thorax, the horse clinically improved and breathing became less forced. The horse was started on broad spectrum antibiotics – sodium-benzylpenicil-

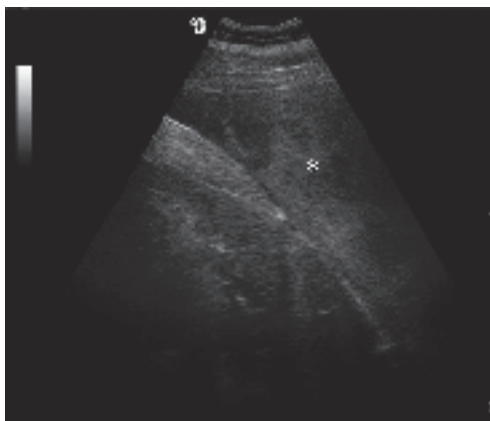


Fig. 1 Intercostal ultrasonographic view of the right thorax, with dorsal to the right. A large amount of echogenic pleural effusion (asterisk) is present in both left and right thoracic cavity. *Rechter Thorax: interkostale Ultraschallansicht, rechts ist dorsal. In der linken sowohl in der rechten Brusthöhle findet sich ein deutlicher (oder massiver) Pleuraerguss (Asterisk).*



Fig. 2 Intercostal ultrasonographic view of the right thorax, with dorsal to the right. Halfway between the dorsal and ventral border of the thorax, a mass with an irregular shape and irregular structure with anechoic areas was present within the echogenic pleural effusion (#). Pressure atelectasis of the tip of the lung was visible (arrow) (mass is between callipers, dia = diaphragm, lever = liver). *Rechter Thorax: interkostale Ultraschallansicht, rechts ist dorsal. Halbwegs zwischen dem dorsalen und ventralen Rand des Thorax, ist eine Masse mit einer unregelmäßigen Form und Struktur vorhanden. In der Masse sind echoarme Gebiete vorhanden. Die Masse befindet sich im echogenen Pleuraerguss (#). Druckatelektase der Lungenspitze ist sichtbar (Pfeil) (Die Masse ist mit Kreuzen gekennzeichnet; dia = Diaphragma, lever = Leber).*

lin 10×10^6 IE IV three times a day, (Benzylpenicilline[®], Eurovet Animal Health, Bladel, The Netherlands) and gentamicin 6.6 mg/kg BW once daily IV (Genta-Ject[®], Dopharma Research B.V., Raamsdonksveer, The Netherlands) – and non-steroidal anti-inflammatory drug (NSAID) – flunixin-meglumine 1.1 mg/kg BW once daily (Meflosyl[®] 5% Zoetis B.V., Capelle a/d IJssel, the Netherlands).

The following day, the horse was attentive, had a moderate appetite and a normal breathing pattern, but developed mild oedema around the thorax drain, oedema of the glans penis and a priapismus of the penis. Further bloodwork revealed normal clotting times; Prothrombine Time was 11.2sec and Activated Partial Thromboplastin Time was 40.3sec. Fibrinogen levels were within normal limits (2.4 g/L). Total Protein levels and subsequent electrophoresis results were also within normal limits.

Repeated ultrasonography of the thorax revealed a moderate amount of echogenic fluid in the left and right pleural space. In the right caudal pleural space, about halfway between the dorsal and ventral border of the thorax, a mass with an irregular shape and irregular structure with anechoic areas was present (Fig. 2). The dorsal part of the mass had a pointy shape. Part of the mass had a layered appearance. Colour Doppler examination was not reliable because of the breathing and the cardiac movement, so it was not possible to differentiate between a tumour mass and a blood clot. Ultrasonographic differential diagnosis included a tumour – for example, a haemangiosarcoma or a haematoma/blood clot. Over the next 2 days, the antimicrobial therapy was continued, the penis and preputium were massaged (to decrease the oedema) and the thorax continued to drain, albeit less and less. The horse remained clinically stable.

The ultrasonographic examination was repeated three days after the last and the pleural effusion had decreased substantially. The atelectasis in the ventral lung parts was less pronounced and air filled areas were now visible within the col-

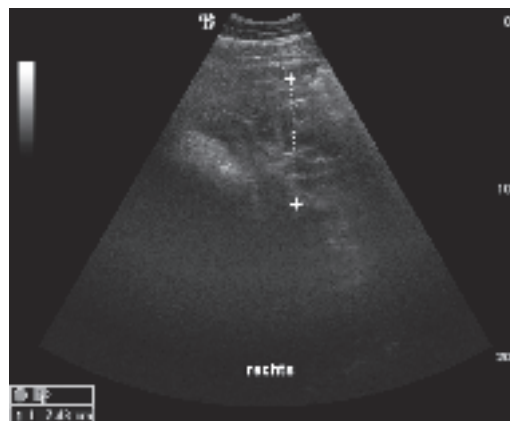


Fig. 3 Intercostal ultrasonographic view of the right thorax, with dorsal to the right. A mass was present in the right ventral pleural space with a similar irregular shape and anechoic areas within the mass. This mass was more rounded in shape and the anechoic areas were increased in size. *Rechter Thorax: interkostale Ultraschallansicht, rechts ist dorsal. Eine Masse mit einer ähnlichen unregelmäßigen Form und echoarme Bezirke innerhalb der Masse, war im rechten, ventralen Thoraxraum vorhanden. Diese Masse war mehr abgerundet und enthielt größere anechogene Gebiete.*

lapsed parts of the lung. During this examination the previously described mass in the right mid pleural space could not be visualised. A mass could be located in the right ventral pleural space, however, with a similar, albeit more rounded, irregular shape and larger anechoic areas within the mass (Fig. 3). It could not be determined whether this was another mass or that the same mass had moved ventrally, but the latter would be more indicative of a blood clot than a tumour mass. The next day the thorax drain was removed and antimicrobial treatment was continued as during the previous days. The next morning it was noticed that the horse showed haematuria. Therefore a cystoscopy was performed which showed the haemorrhagic fluid originated from the right ureter.

Subsequent ultrasonographic examination of the kidneys showed a rounded mass of 5.5 cm in diameter in the caudal pool of the right kidney with a mixed hyper- and hypoechoic structure (Fig. 4A, B). The remaining part of the right kidney had a normal size, shape and structure with a normal cortex and medulla differentiation. The pyelum was not distended. The left kidney was within normal limits. The tentative diagnosis of a primary kidney tumour with most likely metastasis to the pleural space was made and after consulting the owner the horse was humanely euthanised, because of the grave prognosis.

Pathological examination of the horse was performed and revealed 2 litres of haemorrhagic fluid in the pleural space, consistent with non-coagulated blood and serum. In all

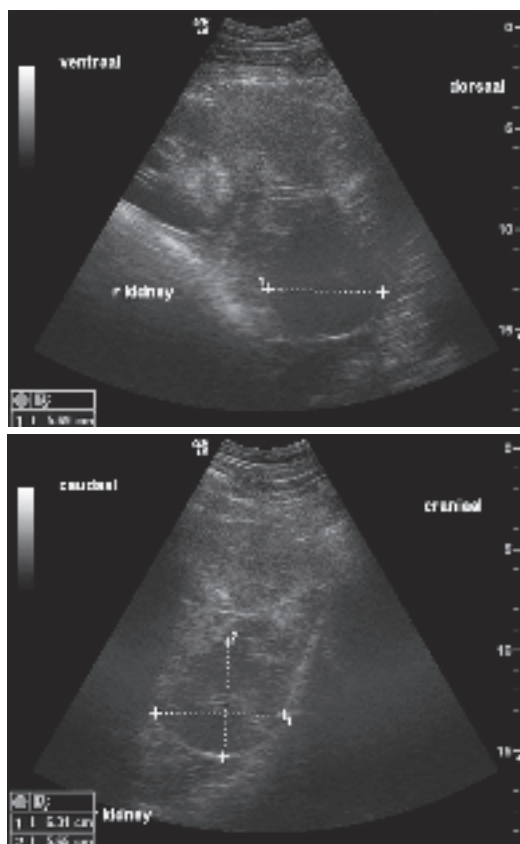


Fig. 4 A, B Transcutaneous ultrasonographic views of the right kidney, (A) with dorsal to the right, (B) with cranial to the right. A rounded mass was present in the caudal pool of the right kidney with a mixed hyper and hypoechoic structure
Rechte Niere, transkutane Ultraschallansicht, (A) rechts ist dorsal, (B) rechts ist cranial. Eine abgerundete Masse mit gemischten hyper- und echoarmen Struktur ist im kaudalen Pol der rechten Niere zu sehen.

lung lobes small red and white, bulging firm masses were visible, varying in size between 1 and 15 mm (Fig. 5). A large blood clot of 13 cm in diameter was attached to the right caudal lung lobe. In the left posterior wall of the heart a rounded, dark red, moderately firm mass of 15 mm in diameter was present (Fig. 6). The perirenal tissue of the left kidney was severely oedematous and half of the capsule was covered by a 15 cm thick haematoma. Focally the capsule was ruptured and the underlying renal parenchyma contained a wedge shaped haemorrhagic infarct (Fig. 7). In the cortex of the right kidney was a nodular firm red mass of 2 cm in diameter

Microscopic examination of both kidneys revealed (in the cortex and at the cortico-medullary junction) an infiltrative growing, partly encapsulated, highly cellular, poorly demarcated neoplasm (Fig. 8). The neoplastic cells were arranged in sheets, multifocally in bundles and focally the cells seemed to form vascular channels containing few erythrocytes. Tumour cells in the right kidney were surrounded by large amounts of fibroblasts (desmoplasia). The neoplastic cells were ovoid to polygonal, 10 to 25 micrometres in diameter with distinct cell borders, a moderate to abundant amount of eosinophilic cytoplasm and one to two large, often eccentrically placed ovoid nuclei, with coarsely stippled chromatin and occasionally a prominent nucleolus. The neoplastic cells showed moderate to severe anisokaryosis and anisocyt-



Fig. 5 Lung: Numerous neoplastic masses in different sizes (arrows) are visible in the lung parenchyma.
Im Lungenparenchym sind zahlreiche neoplastische Gebiete mit verschiedenen Größen (Pfeile) sichtbar.

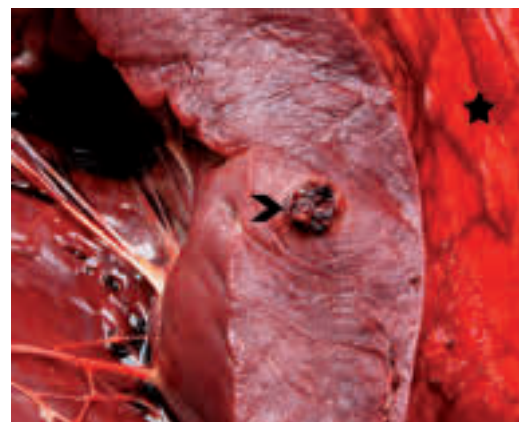


Fig. 6 Heart: Within the myocardium of the left posterior wall is a tumorous mass present (arrow). Next to the heart lung tissue is visible (star).
Im Myokard ist eine tumorartige Masse sichtbar (Pfeil). Neben dem Herz ist Lungengewebe (Stern).

tosis with 21 mitotic figures in 10 high power fields (400×). Regularly bizarre mitoses were encountered. Multi-focally fibrin thrombi and tumour emboli within blood vessels were present with secondary extensive coagulation necrosis and haemorrhages and moderate numbers of siderophages. Glomeruli had multi-focally thickened basal membranes and were multi-focally infiltrated by moderate amounts of neutrophils. Multi-focally tubular cellular casts (some with neutrophils, some with erythrocytes) and proteinaceous casts were visible (haematuria and proteinuria). Multi-focally within the pulmonary blood vessels, infiltrating into the surrounding parenchyma, the previously described neoplastic cells were present, consistent with embolic seeding/ metastasis (Fig. 9). The mass located in the myocardium was composed of similar neoplastic cells. The surrounding blood vessels and lymphatic vessels were also invaded by neoplastic cells (Fig. 10).

The primary diagnosis was a pleomorphic infiltrative neoplasia (presumably mesenchymal) of unknown primary origin with tumour cells found in both kidneys, lungs and heart. Based on the pathomorphological examination this mass was considered to be most likely an epithelioid angiosarcoma, as

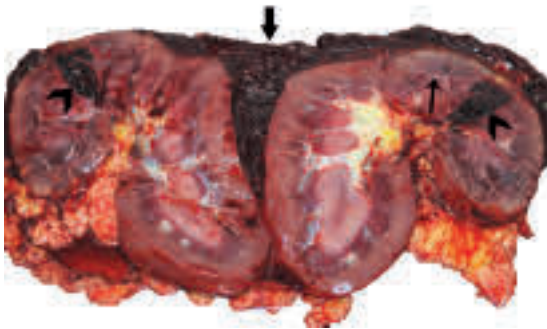


Fig. 7 Left kidney: On cut surface are two hemorrhagic infarcts (arrow heads) and necrosis (thin arrow) visible. The thick arrow points to the large hematoma covering the capsule.
Linke Niere. Auf der Schnittfläche sind zwei hämorrhagische Infarkte (Pfeilspitze) und Nekrose (dünner Pfeil) sichtbar. Der dicke Pfeil zeigt das umfangreiche Hämatom auf der Kapsel an.

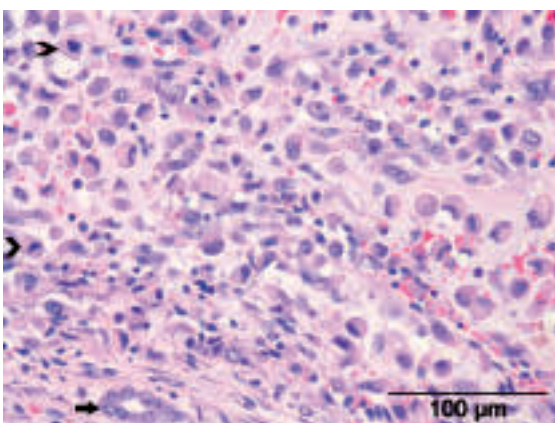


Fig. 8 Kidney: High magnification of the tumour cells. Note the distinct variation in size and shape of the cells and the nuclei. Also two mitosis (arrow heads) and one renal tubule (arrow) are visible. (Haematoxylin and eosin (H&E), 200× magnification).
Niere. Vergrößerung der Tumorzellen. Die Zellen und Kerne zeigen eine deutliche Variation in der Größe sowie der Form. Zwei Mitosen (Pfeilspitze) und ein Niertubulus (Pfeil) sind ebenfalls sichtbar. (Hämatoxylin- und Eosinfärbung (HE), 200-fache Vergrößerung).

the neoplastic cells seemed to form vascular channels focally. However, after additional immunostaining showed negative for Factor VIII and Cytokeratin and positive for Vimentin, the diagnosis was adjusted to anaplastic sarcoma.

Discussion

The first clinical signs of the horse were bilateral epistaxis and lethargy. The most common cause of bilateral epistaxis is exercise-induced pulmonary haemorrhage (EIPH), during or after strenuous exercise and this occurs commonly in Thoroughbred, Standardbred and Quarter Horse racehorses (Perkins et al. 1999). Other causes of bilateral nose bleeding, originating from the lower respiratory tract, are pulmonary abscesses, trauma, pulmonary neoplasia, pneumonia, pleuritis or a pulmonary foreign body. The blood can also originate from the upper respiratory tract: from the guttural pouches (empyema or mycosis) or pharynx (trauma, foreign body, neoplasia, or abscess) (Perkins et al. 1999, Edwards and Greet 2006). Haemorrhage can also occur secondary to a coagulopathy, such as a thrombocytopenia. Progressive ethmoidal haematoma usually gives an unilateral epistaxis (Schumacher and Dixon 2006).

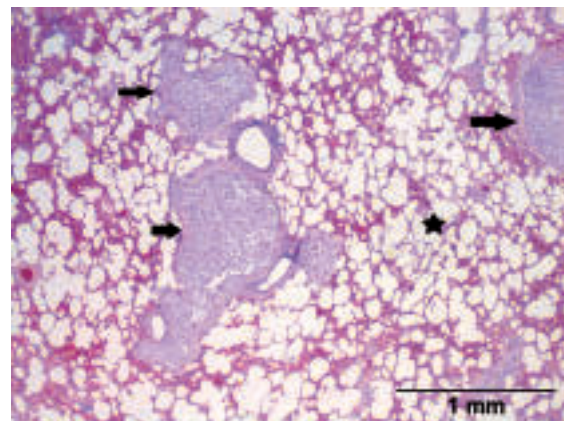


Fig. 9 Lung: Tumour emboli in blood vessels (arrows) surrounded by alveoli (star) (H&E, 20× magnification).
Lungen. Tumoremboli in Blutgefäßen (Pfeile) umgeben von Alveolen (Stern) (HE, 20-fache Vergrößerung).

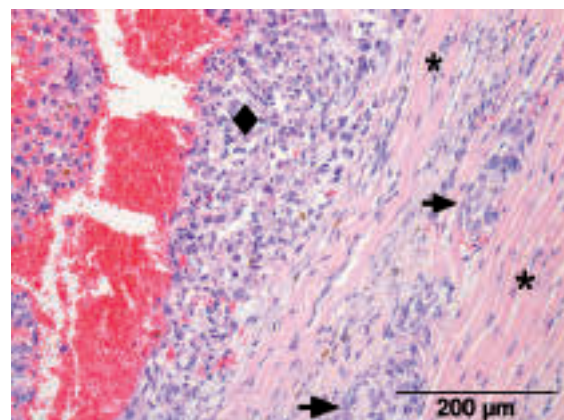


Fig. 10 Heart: Anaplastic sarcoma (thrombus) in the myocardium (asterisk). The arrows point to tumour emboli in blood vessels. (H&E, 100× magnification).
Herz: Anaplastisches Sarkom (Raute) im Myokard (Asterisk). Die Pfeile zeigen Tumoremboli in Blutgefäßen an. Hämatoxylin- und Eosinfärbung (HE, 100-fache Vergrößerung).

Haemothorax has been described secondary to trauma (blunt or penetrating), as a complication of a lung biopsy, due to a bleeding tumour (such as a haemangiosarcoma), an abscess, a coagulopathy, a pulmonary infarction, a lung lobe torsion or laceration of the pulmonary or pleural vessels (Perkins et al. 1999, Mair 2006). Traumatic incidents often also cause a pneumothorax as well as a haemothorax.

The clinical signs of the horse at presentation in the referral clinic (difficulty walking, tucked up belly, tachycardia, tachypnea, body temperature 38.6°C, nostril flaring), combined with the echogenic pleural effusion (diagnosed by ultrasonography), were considered consistent with the differential diagnosis of haemothorax or pleuritis/pleuropneumonia. Both are considered painful conditions, and even a small amount of pleural fluid can cause tachypnea by stimulating the parietal pleura (Perkins et al. 1999). Furthermore when a large volume of fluid is present in the thorax the lung volume is decreased by pressure, which also results in tachypnea. The thoracocentesis and subsequent drainage of the pleural fluid confirmed the haemothorax. The thoracocentesis was performed over the cranial aspect of the 8th rib of the right thoracic wall to avoid the dorsal intercostal arteries located caudal to the ribs. A Penrose drain was fixed to the opening of the Foley catheter to act as a valve and to prevent the manifestation of a pneumothorax and ascending infection.

The history of the horse did not reveal any signs of trauma or invasive procedure like a lung biopsy. The blood examination showed no signs of coagulopathies. Although cytological examination of the pleural fluid was not performed, the fluid had a PCV of 0.267 l/l, compatible with the PCV of the horse that morning, so the fluid was presumed to be whole blood. As differential diagnosis a spontaneous bleeding secondary to an abscess or a tumour was likely.

A repeated radiographic examination of the thorax – after resolving the pleural effusion – could possibly have shown metastases within the lung parenchyma, but this was not performed. Ultrasonographic examination of the thorax showed a mass in the right pleural space. The structure of the mass was most consistent with a neoplastic mass, but a blood clot could not be excluded. As the mass was not visible at the same site during repeated ultrasonography 3 days later, but a similar mass could be found more ventrally in the right pleural space, a tumour origination from the lung/pleura was considered less likely. The pathological examination revealed a 13 cm mass attached to the right caudal lung lobe and this is most likely the mass found on ultrasonography. A possible explanation for the different location of the mass on the two ultrasonographic examinations is the fact that the amount of pleural effusion decreased substantially between both examinations. It could be argued that a large amount of pleural fluid causes dorsal displacement of the lung lobes including the mass and following drainage of the fluid a more ventral position of the right caudal lung lobe and tumour mass was obtained.

The horse steadily improved over the following days and the drain was removed. Haematuria was observed a day later. Possible causes for haematuria are urolithiasis, urethral rents in geldings, urethritis, cystitis, pyelonephritis and renal and

vesicular neoplasia, idiopathic haematuria, verminous nephritis and blister beetle toxicosis (Schumacher 2007). Cystoscopy showed an unremarkable bladder with no calculi and haemorrhagic fluid coming out of the right ureter. This warranted an additional ultrasonographic examination of the kidneys, which revealed the soft tissue renal mass in the right kidney suggestive of a neoplasia.

After the horse was humanely euthanized, pathological examination was performed and a pleomorphic infiltrative neoplasia (mesenchymal) primary in the kidneys with metastasis to the lungs and heart was diagnosed.

Because of the multiple tumour sites and the lack of differentiation, making it impossible to define its tissue of origin, it was hypothesised that it could be a cancer of unknown primary site (Varadhachary and Raber 2014). The tumour pattern in the lungs was consistent with metastasis. However also the heart and both kidneys contained tumour emboli of which it was not possible to determine if these were leaving the primary tumour site or were part of the formation of distant metastases. As the tumour was most voluminous in the kidneys this could be the primary tumour. In that case it remains unusual that both kidneys were affected. Subsequent Cytokeratin and Factor VIII-related immunohistochemistry were both negative, ruling out carcinoma and a neoplasm of endothelial origin (such as epithelioid angiosarcoma), leaving an anaplastic sarcoma as the diagnosis. This was consistent with the subsequent positive stain for Vimentin.

Primary renal tumours are rare in horses, being observed in 0.11% of all horse tumours (Rumbaugh et al. 2003, Wise et al. 2009). Renal carcinoma, also known as renal cell carcinoma and renal adenocarcinoma, have been found in 27 horses in total (Wise et al. 2009). In 33% of these cases, haematuria was one of the initial complaints.

To the authors' knowledge this is the first description of a renal anaplastic sarcoma in a horse with metastases to the lungs and heart, with subsequent haemothorax and epistaxis. Human anaplastic sarcoma in the kidney is a very rare renal pediatric tumour, with only 21 cases described (Vujani et al. 2007, Watanabe et al. 2013). The age of these patients ranged from 10 months to 41 years, with 75% of the patients under 15 years of age (Vujani et al. 2007). Haematuria was the presenting symptom in only three cases (Vujani et al. 2007, Watanabe et al. 2013).

Conclusions

Anaplastic sarcoma is a very rare tumour in horses, but should nevertheless be considered as a possible differential diagnosis. Epistaxis and haemothorax can both be caused by a primary tumour or metastasis in the lungs. Anaplastic sarcoma also caused haematuria in this case due its primary location in the kidney.

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Erweiterte Zusammenfassung

Hämatothorax und Hämaturie eines niederländischen Warmblut-Wallachs durch Metastasen eines anaplastischen Sarkoms

Ein 5-jähriger niederländischer im Springsport eingesetzter Warmblutwallach wurde als Notfall-Patient überwiesen. In der Woche vor der Vorstellung in der Klinik hatte das Pferd nach dem Training eine Episode eines akuten, milden, bilateralen Nasenblutens. Am Morgen vor der Überweisung zeigte das Pferd bilaterales Nasenbluten, Lethargie, steifen Gang, breitbeinige Haltung, Anorexie, Atemnot, Nasenflügeln, Scharren und eine Abwehrspannung.

Bei der klinischen Untersuchung zeigte der Wallach immer noch einen sehr steifen Gang, war bewegungsunwillig und hatte einen hochgezogenen Bauch. Das Pferd erschien etwas träge. Die Herzfrequenz war erhöht (90 Schläge/min), Schleimhautfarbe und Rekapillarierungszeit waren normal, die Körpertemperatur war erhöht (38,6°C) und das Pferd zeigte eine angestrenzte Atmung, Nasenflügeln und Tachypnoe. Die Auskultation der Lungen ergab ventral reduzierte Atemgeräusche auf beiden Seiten. Eine für Notfälle übliche Blutuntersuchung wurde durchgeführt und ergab eine leicht erhöhte Anzahl der weißen Blutkörperchen (WBC) ($12,2 \times 10^9/l$), einen leicht verringerten Hämatokrit (0,32%), einen normale pH-Wert des Blutes (7,47) und eine erhöhte Laktatkonzentration im Blut (3,02 mmol/l). Die Ultraschalluntersuchung des Thorax zeigte eine große Menge echorei-

cher Flüssigkeit in sowohl dem linken als auch dem rechten Pleuraraum mit mehreren echoarmen Umfangsvermehrungen (Abb. 1). Diese Befunde waren vereinbar mit Blut, Hämatom oder Eiter. Die Röntgenuntersuchung zeigte, dass der ventrale Teil des Brustkorbs durch eine Weichteilopazität mit horizontalem Rand verschleiert war, was auf Pleuraerguss schließen ließ. Es wurde die Verdachtsdiagnose "Pleuritis/Pleuropneumonie" gestellt. Eine Thorakozentese auf der Höhe des siebten Zwischenrippenraumes, kranial der 8. Rippe, wurde durchgeführt. Nach der Einführung des Foley-Katheters wurde ein Gesamtvolumen von 7 Liter hämorrhagischer Flüssigkeit passiv entfernt. Diese Flüssigkeit hatte einen Hämatokrit von 0,27%. Nach der Drainage des Thorax verbesserte sich das klinische Bild des Pferdes und die Atmung war weniger angestrengt. Das Pferd wurde mit Breitbandantibiotika und nicht-steroidalen Antiphlogistika (NSAID) behandelt.

Eine erneute Sonographie des Thorax zeigte eine moderate Menge echoreicher Flüssigkeit sowohl im linken als auch rechten Pleuraraum. Im rechten kaudalen Pleuraraum, halbwegs zwischen dem ventralen und dorsalen Rand des Thorax, befand sich eine Umfangsvermehrung mit unregelmäßiger Form und Struktur (Abb. 2). Als sonographische Differentialdiagnosen kamen ein Tumor oder ein Hämatom/Blutgerinnsel in Betracht. Nach drei Tagen wurde die Ultraschalluntersuchung wiederholt wobei sich der Pleuraerguss als wesentlich verringert darstellte. Während dieser Untersuchung fiel eine Umfangsvermehrung im rechten ventralen Pleuraraum (Abb. 3) auf. Am nächsten Morgen zeigte das Pferd Hämaturie worauf eine Zystoskopie durchgeführt wurde. Dabei erwies sich, dass die hämorrhagische Flüssigkeit ihren Ursprung im rechten Harnleiter hatte. Die nachfolgende sonographische Untersuchung der Nieren zeigte eine abgerundete Umfangsvermehrung von 5,5 cm Durchmesser mit gemischt hyper- und echoarmer Struktur im kaudalen Pol der rechten Niere (Abb. 4 A, B). Die Verdachtsdiagnose eines primären Nierentumors mit wahrscheinlicher Metastasierung in den Pleuraraum wurde gestellt und das Pferd eingeschläfert.

Die pathologische Untersuchung des Pferdes ergab 2 Liter hämorrhagischer Flüssigkeit im Pleuraraum. In allen Lungenlappen waren derbe Massen in verschiedenen Größen von 1 bis 15 mm Durchmesser sichtbar (Abb. 5). Ein großes Blutgerinnsel von 13 cm Durchmesser haftete dem rechten kaudalen Lungenlappen an. In der linken posterioren Herzwand war ein Knoten von 15 mm Durchmesser vorhanden (Abb. 6). Die Hälfte der Kapsel der linken Niere wurde von einem dicken Hämatom bedeckt und im korrespondierenden Nierenparenchym war ein keilförmiger hämorrhagischer Infarkt vorhanden (Abb. 7). In der Rinde der rechten Niere befand sich eine knotige derbe rote Masse von 2 cm Durchmesser. Die mikroskopische Untersuchung beider Nieren zeigte im Kortex und auf der Höhe des kortikomedullären Überganges einen infiltrativ wachsenden, teilweise abgekapselten, zellreichen, schlecht begrenzten Tumor (Abb. 8). Multifokal waren neoplastische Zellen innerhalb der pulmonalen Blutgefäße und in dem umgebenden Parenchym sichtbar (Metastasen, Abb. 9). Die Masse im Myokard bestand aus ähnlichen neoplastischen Zellen. Auch in den umliegenden Blut- und Lymphgefäßen waren diese Tumorzellen zu finden (Abb. 10). Die Primärdiagnose war pleomorpher maligner, vermutlich mesenchymaler Tumor unbekanntes Primärursprungs mit Streuung in beide

Nieren, Lunge und Herz. Mit Hilfe zusätzlicher immunohistochemischer Färbungen (negativ für Faktor VIII-related antigen und Zytokeratin und positiv für Vimentin) wurde anaplastisches Sarkom diagnostiziert.

Die Anamnese des Pferdes hatte keinen Hinweis auf Trauma oder invasives Geschehen wie eine Lungenbiopsie und die Blutuntersuchung hatte keine Anzeichen von Gerinnungsstörungen gegeben. Die Pleuraflüssigkeit hatte einen Hämatokrit von 0,267% aufgewiesen, vergleichbar dem des am Morgen abgenommenen Blutes. Aus diesem Grund war vermutet worden, dass es sich bei Flüssigkeit um Vollblut handelte. Eine spontane Blutung in Verband mit einem Abszess oder einem Tumor war demnach die wahrscheinlichste Differentialdiagnose. Einen Tag später wurde Hämaturie beobachtet. Die Zystoskopie zeigte hämorrhagische Flüssigkeit, die aus dem rechten Harnleiter stammte. Dieses Ergebnis wurde durch eine zusätzliche Ultraschalluntersuchung der Nieren bestätigt, die eine weiche Umfangsvermehrung in der rechten Niere ergab, was für eine Neoplasie sprach.

Nach der Euthanasie des Pferdes wurde eine Sektion durchgeführt, wobei pleomorphe, infiltrative, mesenchymale Tumoren

in den Nieren, Lungen und im Herz diagnostiziert wurden. Wegen der mehrfachen Tumorlokalisationen und der fehlenden Differenzierung war es unmöglich, das Ursprungsgewebe zu definieren. So wurde die Hypothese einer Tumorerkrankung unbekannter Histogenese aufgestellt. Das Tumormuster in der Lunge wies auf Metastasierung hin, doch auch das Herz und beide Nieren enthielten Tumorzellen, bei denen es sich entweder um abgespaltene Tumorembolien oder um Tumorembolien im Entstehungsprozess von Fernmetastasen handelte. Der Tumor war am größten in den Nieren, weshalb es sich hier um den Primärtumor handeln könnte. In diesem Fall bliebe es dennoch ungewöhnlich, dass beide Nieren betroffen waren.

Primäre Nierentumoren sind beim Pferd selten. Sie werden bei 0,11% aller Pferde beobachtet. Ein Nierenkarzinom, auch Nierenzellkarzinom oder Nierenadenokarzinom genannt, wurden bisher nur bei 27 Pferden beschrieben. In 33% der Fälle war Hämaturie der anfängliche Befund.

Schlüsselwörter: Hämothorax / Hämaturie / anaplastisches Sarkom / Metastasierung / Onkologie