

Metastatic adenocarcinoma of unknown primary origin in the skeletal muscles of sheep - a case report

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ABSTRACT

Metastatic adenocarcinoma of unknown primary origin was incidentally detected in the skeletal muscles of a male sheep slaughtered for meat consumption. The tumour grossly appeared as multiple spherical whitish nodules embedded within the longissimus dorsi and psoas muscles of the internal abdominal wall. Microscopic examination of the nodules revealed scattered lobular masses of glandular structures trapped in-between the skeletal muscle fibres. The lobular masses were composed of neoplastic proliferations of epithelial cells arranged in the form of distinct acini separated by fibrous connective tissue stroma. The acinar cells were mostly cuboidal or short columnar in shape with foamy cytoplasm and hyperchromatic nuclei. The tumour masses were loosely demarcated from adjacent muscular tissue by thin fibrous connective tissue capsule.

Key words: adenocarcinoma, metastatic tumour, neoplasia, skeletal muscle, sheep

Introduction

Neoplasms of the skeletal muscles are not a very common occurrence in man or in domestic animals (NAMBA et al., 1986; SUDO et al., 1993; COOPER and VALENTINE, 2002). Primary muscle tumours designated as rhabdomyomas and their malignant counterpart rhabdomyosarcomas originate from the striated muscle cells (myocytes). Muscle tumours of non-muscular origin may also arise from the supporting elements and other components of the muscular system such as fibroblasts, adipocytes, vascular endothelium or neural tissue (McGAVIN and VALENTINE, 2001). In addition, skeletal muscles may occasionally be invaded by certain types of secondary tumours such as melanomas, haemangiosarcomas, adenocarcinomas, liposarcomas and malignant

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lymphomas. However, neoplastic invasion of these tumours is mainly accomplished by direct expansion or infiltration from neighbouring tissues, particularly the skin and serous membranes (COOPER and VALENTINE, 2002). **Haematogenous metastases to skeletal muscles** are extremely rare for reasons that are not yet clearly understood. However, several cases of metastatic adenocarcinomas of a gastrointestinal or pulmonary origin have been detected in the skeletal muscles of human patients (O'KEEFFE and GHOLKAR, 1988; NASH et al., 2004; HEYER et al., 2005; UNSAL et al., 2005). Pulmonary adenocarcinoma with metastasis to skeletal muscles was also reported in an elderly cat (LANGLAIS et al., 2006). Otherwise, metastatic invasions to skeletal muscles are not very well documented in domestic animals as in the case of humans. The present report, hence, describes the occurrence of metastatic adenocarcinoma in the skeletal muscles of an apparently healthy sheep slaughtered for meat consumption. The tumour was incidentally detected during routine meat inspection.

Materials and methods

The material of this report comprises an ordinary apparently healthy adult sheep slaughtered for meat consumption at the Central Abattoir, Al-Ahsa Province, Kingdom of Saudi Arabia. The sheep was approximately two- year old male, exotic breed with an average bodily condition. The hanging carcass **was initially examined by meat inspectors** who did not report any abnormal findings other than the presence of multiple spherical whitish nodules embedded within some of the skeletal muscles of the internal abdominal wall. The affected muscles were then removed and thoroughly inspected. The nodules were further palpated and incised for visual examination of their cross section and consistency. Representative tissue specimens were obtained and immediately fixed in 10% formal saline for routine histopathological processing and staining with haematoxylin and eosin (DRURY and WALLINGTON, 1980)

Results

Gross examination of affected muscles revealed the presence of several whitish spherical nodules. The grossly visible nodules were partially or completely embedded within the skeletal muscles of the internal abdominal wall. However, the presence of these nodules was only confined to the ventral parts of the longissimus dorsi and the psoas muscles. The size of the nodules was variable, ranging from pin-point tiny spots to much larger ones of some few centimetres in diameter. Their general morphological appearance was apparently similar to some kind of parasitic nodules, granulomas or organized old abscesses. However, their cut surface was homogenous, rather smooth, compact, and rubbery in consistency. No capsular wall was grossly evident but the external surface of the nodules was firmly adherent to the adjacent muscular tissue. Microscopic examination of selected tissue specimens revealed the presence of scattered

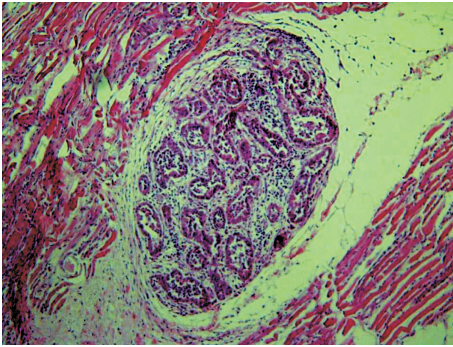


Fig. 1. Lobular mass of glandular structure trapped within skeletal muscle fibres. H&E, $\times 40$.

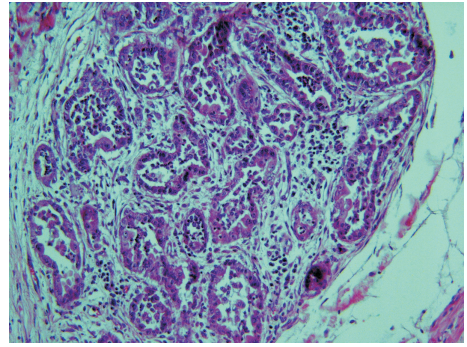


Fig. 2. Higher magnification of the above, showing cuboidal and short columnar neoplastic epithelial cells arranged in acinar form with fibrous C. T. stroma. H&E; $\times 100$.

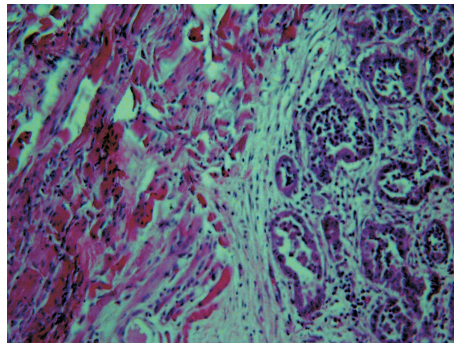


Fig. 3. Demarcation of the tumour by thin fibrous connective tissue capsule. Note swelling, fragmentation and hyaline degeneration of the skeletal muscle fibres. H&E; $\times 100$.

lobular masses of glandular structures trapped between skeletal muscles fibres (Fig.1). The lobular masses were composed of adenomatous proliferations of epithelial cells forming distinct acini separated by moderate amount of interstitial fibrous connective tissue stroma (Fig. 2). The acinar cells were mostly cuboidal or short columnar in shape with foamy cytoplasm and hyperchromatic nuclei. The majority of the acini were almost uniform in shape but variable in size and contained aggregates of mononuclear cells and detached neoplastic epithelium. Mild to moderate mononuclear cellular infiltrations

of lymphocytes, macrophages and plasma cells were also present in the interstitial and interlobular areas. The tumour masses were loosely demarcated from the surrounding muscular tissue by thin fibrous connective tissue capsule (Fig. 3). Secondary degenerative changes dominated by hyaline degeneration together with swelling and fragmentation of the skeletal muscle fibres were further observed in the surrounding muscular tissue of the metastatic growth.

Discussion

Skeletal muscles are not usually recognized as a common site for haematogenous metastases of malignant tumours other than very few examples such as melanoma and malignant lymphoma (COOPER and VALENTINE, 2002). The infrequent metastases to skeletal muscles via the bloodstream has long been attributed to the hypothesis that muscular tissues do not normally offer a local environment that is **favourable for the** survival and proliferation of embolic tumour cells (SEELY, 1980; NAMBA et al., 1986). Nevertheless, several cases of metastatic invasions to skeletal muscles by malignant epithelial tumours have occasionally been reported in medical literature (O'KEEFFEE and GHOLKAR, 1988; HEYER et al., 2005; UNSAL et al., 2005) with only very few examples in veterinary medicine (LANGLAIS et al., 2006). In the present investigation, the occurrence of a metastatic epithelial tumour was also detected in the skeletal muscles of a male adult sheep slaughtered for meat consumption. The tumour was incidentally identified by histological examination of grossly visible nodules embedded within the skeletal muscles of the internal abdominal wall. The morphological appearance of the tumour was indicative of adenocarcinoma of the acinar type with fairly differentiated neoplastic epithelial cells supported by fibrous stroma. However, the primary malignant growth was not detected, probably because of the rapid removal of offal during routine meat inspection in the abattoir. Besides, recognition of the primary site of tumour metastases is not always possible even in hospital medical records. In this connection, more than 60% of metastatic adenocarcinomas in human patients were found to be of unknown primary origin (HAMMAR et al., 1987; HAMMAR, 1998).

It has been commonly observed that the majority of the reported metastases in the skeletal muscles of human patients are mostly derived from the gastrointestinal epithelium (HEYER et al., 2005; UNSAL et al., 2005). A limited number of skeletal muscle metastases were further found to be of a pulmonary origin (NASH et al., 2004). However, the morphological features of the presently described metastatic tumour in the skeletal muscle of a sheep did not conform to gastrointestinal adenocarcinomas which usually occur in tubular, papillary, mucinous or signet-ring cell variants. The presently described metastatic tumour, on the other hand, assumed an acinar arrangement of cuboidal and short columnar cells apparently resembling pulmonary bronchiolar-alveolar adenocarcinoma.

Although the lungs were not examined in the present case, yet the metastatic distribution of pulmonary tumours is fairly common in various extrathoracic organs including the liver, kidneys, brain, spleen, lymph nodes and gastrointestinal tract (ANTLER et al., 1982; STENBYGAARD et al., 1995).

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SAŽETAK

Metastatski adenokarcinom nepoznatoga primarnoga podrijetla slučajno je ustanovljen u skeletnom mišićju zaklanoga ovna. Tumorska tvorevina sastojala se od okruglih, bjelkastih čvorića uraštenih u unutarnji sloj najdužega lednoga mišića i psoasnoga mišića. Mikroskopska pretraga pokazala je lobularnu tvorevinu glandularne građe unutar mišićnih vlakana. Lobularne tvorevine sastojale su se od neoplastičnih proliferativnih epitelnih stanica u obliku režnjića odvojenih od strome vezivnim tkivom. Acinarne stanice bile su kubičnoga ili izduženoga oblika s vakuoliziranim izgledom citoplazme i hiperkromatskim jezgrama. Tumorske tvorevine bile su blago ograničene od okolnoga mišićnoga tkiva tankom vezivnotkivnom kapsulom.

Ključne riječi: adenokarcinom, metastatski tumor, neoplazija, kosturni mišić, ovca
