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Abstract: The lynx, which was reintroduced to Switzerland after being exterminated at the beginning of the 20th century, is protected by Swiss law. However, poaching occurs from time to time, which makes criminal investigations necessary. In the presented case, an illegally shot lynx was examined by conventional plane radiography and three-dimensional multislice computertomography (3D MSCT), of which the latter yielded superior results with respect to documentation and reconstruction of the inflicted gunshot wounds. We believe that 3D MSCT, already described in human forensic-pathological cases, is also a suitable and promising new technique for veterinary pathology.
Forensic veterinary radiology: Ballistic-radiological 3D computertomographic reconstruction of an illegal lynx shooting in Switzerland

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Abstract

The lynx, which was reintroduced to Switzerland after being exterminated at the beginning of the 20th century, is protected by Swiss law. However, poaching occurs from time to time, which makes criminal investigations necessary. In the presented case, an illegally shot lynx was examined by conventional plane radiography and three-dimensional multislice computertomography (3D MSCT), of which the latter yielded superior results with respect to documentation and reconstruction of the inflicted gunshot wounds. We believe that 3D MSCT, already described in human forensic-pathological cases, is also a suitable and promising new technique for veterinary pathology.

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1. Introduction

The lynx (Lynx lynx) was completely exterminated in Switzerland at the beginning of the 20th century. Only the release of captive animals into the wild and protection regulations enabled the present population of about 100 free-living adult lynxes in Switzerland. The lynx is the largest feline predator living in Switzerland. It differs from other cats by its long-leggedness, which facilitates living in a snow-rich habitat. Lynxes have now survived in Switzerland for about 30 years, especially in the northwestern Alps and the Jura Mountains [1]. However, conflicts with hunters and sheep farmers arise from time to time. In the northwestern Alps, the lynxes have occupied almost all suitable habitats, thus giving rise to damage to livestock. This damage was so great, that several lynxes had to be culled. For this reason a resettlement, i.e. into eastern Switzerland, was undertaken to minimise these problems.

Despite efforts of the Federal Bureau of Environment, Forestry and Agriculture, as well as several lynx protection organisations, illegal shootings of these protected animals occur occasionally. In the year 2000, poachers shot at least eight lynxes, and since 1974 at least 50 illegal killings could be proven [2].

2. Case report

In December 2000, a young lynx was found dead in a plastic bag in front of a supermarket. The police ordered an investigation, as the law in Switzerland protects these animals. The Institute of Forensic Medicine of the University of Berne was called upon by the Institute of Veterinary Pathology to assess the discovered gunshot wounds.

3. Forensic examinations and results

A total of three through-and-through wounds and one retained ricocheted, badly deformed, full steel-jacketed bullet of indistinguishable calibre in the right forelimb were found in...
the delivered fur (Fig. 1) and the already autopsied animal cadaver (Fig. 2).

Four entry wounds were seen on the right side of the lynx cadaver. No gunpowder residue could be detected in the vicinity of the entrance wounds or the underlying bones. The left side presented three exit wound groups located in the cervical and the loin region, as well as the shoulder blade.

For the reconstructive analysis of the bullet courses, the fur was placed on the cadaver (Fig. 3) and conventional radiographs (Fig. 4) and three-dimensional multislice computed tomography (3D MSCT) examinations (Figs. 5 and 6) were performed. The 3D MSCT scans proved superior to conventional radiographs with respect to reconstruction of the bullet course. Using 3D MSCT and subsequent 3D reconstructions (General Electric Advantage GE-Workstation) through-and-through wounds of the shoulder blade and the vertebral column could be visualised in addition to the ricocheted bullet remains in the right forelimb (Fig. 5).

As in the entry wounds seen in the fur, the diameter of the shoulder blade defect seen during autopsy (Fig. 7) and the corresponding 3D MSCT image (Fig. 6) was about 5–6 mm. A further through-and-through gunshot wound led to an injury of the spine, which could be demonstrated using 3D MSCT (Fig. 6). The veterinary-pathological autopsy showed multiple pulmonary lacerations that led to a death due to exsanguination. No pre-existing pathological findings could be detected during autopsy. Therefore, death occurred solely due to the inflicted gunshot injuries.
4. Discussion

As has been described before [3], post-mortem radiological examination of killed animals can give valuable initial or additional information.

In this case, it was clearly evident that the lynx had been shot upon. However, the ricocheted and therefore badly deformed full metal jacketed projectile found in the right forelimb of the carcass gave no clue as to what kind of ammunition was used. Although the highly elastic fur of the lynx leaves little or no clues as to the diameter of the bullet, the bones do. In extracranial bones of predominantly spongy structure, solid bullets of calibre .22 tended towards the formation of holes greater than the bullet diameter. The opposite was seen in jacketed projectiles of calibre 7.65 and 9 mm [4]. As the retrieved projectile was clearly jacketed, it is to be assumed that the resulting hole should therefore be possibly smaller than the osseous defect. Due to the entry wound diameters of the shoulder blade of about 5–6 mm and the extent of the damage to the spine, we concluded that the used ammunition was most likely a projectile of 5 or 6 mm diameter. Therefore, a weapon with calibre 5.6 mm is highly likely. Indeed, a weapon with a full steel-jacketed projectile of calibre 5.6 mm, namely the Swiss army assault rifle, springs to mind. As this is the usual army ordinance weapon of an army mainly based on compulsory military service, this assault rifle is extremely widespread in Switzerland. The use of another rifle with a likewise full metal design and calibre 5.6 mm, as in the case of certain hunting rifles can obviously not be excluded. However,
such hunting rifles are far rarer than the above mentioned assault rifle which is present in most Swiss households.

The injuries were caused by several single shots, of which one bullet was deflected from the ground and ricocheted into the right forelimb of the lynx. As the spine and the spinal cord were severed, the animal was probably paralysed shortly before death. Death occurred due to a fatal haemorrhage due to multiple pulmonary lacerations.

The multislice computed tomography examination was superior to the conventional plane radiograph with regard to reconstructive ballistic questions. This was most evident in the osseous system with regard to documentation and significance. In contrast to the two-dimensional conventional radiograph, which portrays a three-dimensional body onto a two-dimensional film, computed tomography allowed for a three-dimensional documentation.

The post-processing of the three-dimensional CT data enables for, as shown in this case (Figs. 5 and 6), new documentation and visualisation possibilities for the presentation of forensic-morphologic results. As has already been shown in the past on humans [5–9], 3D MSCT has an enormous potential in the field of case reconstruction in forensic medicine. As this case report demonstrates, this obviously does not only apply for human cases, but also for forensic veterinary cases.

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References