The use of animals’ anatomy in ENT-education
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Introduction
Temporal bone preparation is indispensable for learning microsurgery on the ear. Unfortunately human biologies are difficult to achieve. Animals might be an alternative for training and learning anatomy. We want to show the similarities, as well as the differences between lamb, pig and the human temporal bone.

Material and methods
We used 10 temporal bones of the lamb and pig from a butcher’s daily routine and posed them in formalin. After fixation a removal of the soft tissue performed.

We carried out an anatomical dissection with standard microsurgical instruments used in ear surgery. The steps were performed according to typical steps in ear surgery. As we could find some anatomical variations, the drilling work was adapted to lamb and pig.

Opening of the hypotympanon, the external ear canal, the removal of the tympanic membrane and a mastoidectomy was done with each temporal bone.

Results
Temporal bone of the lamb
The temporal bone of the lamb is smaller and slight build compared to the human one. It has a wide hypotympanic bulla which can easily be opened to access the middle ear for anatomic studies. The ossicular chain is very similar to the human one. For surgical training it is evident that the incus has a longer short process and a shortened long process. The mastoid is never pneumatized and has a space filled with fat tissue at its top. The horizontal arcade can be found lateral to the lambs’ incus.

Temporal bone of the pig
The outstanding attribute of the big pig’s temporal bone is a very long and strong external ear canal with a length of approximately 4 cm. The tympanic membrane and the middle ear can only be accessed by an artificial outer ear meatus. The middle ear structures are very similar to the human ones. The sizes are nearly the same. The mastoid is not pneumatized. Not all arcades can be found by this surgery, because the lateral one is located behind the external ear canal.

Discussion
The young sheep and the pig seem to be good donors to surgical training, as they provide the same physical behaviour as human tissue. The mastoid of the lamb can only be recommended for training expert users. The pigs mastoid is completely inapplicable. The ossicular chains in both animals are similar to the human ones and can be used for training reconstructive techniques in ear surgery. Training the handling of typical microsurgical instruments can also be improved by using animal bones. Neither the lamb nor the pig can be used as a complete substitute for human preparation.

Conclusion
The lamb shows similar anatomy to the human middle ear. The hypotympanon provides a very good access for anatomic studies. The mastoidectomy in the lamb is very difficult.

The pigs middle ear structure only differs in a few points from the human one. They are only accessible via an artificial opening of the frontal part of the external ear canal. The mastoid is inapplicable.

Both animals show that their use in teaching ear surgery might be a good additional option to traditional techniques, as they provide the same mechanical condition as the human.

Literature
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