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ANATOMICAL AND RADIOLOGICAL OBSERVATIONS ON THE TEMPROMANDIBULAR ARTICULATION IN VARIOUS MAMMALS

PART I: RUMINANTS

By

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INTRODUCTION

Surgical treatment of internal rangement of the tempromandibular joint is considered as a mon technique in practice of surgery in man. Different anis were used as an experimental dels. However in domestic anis, nothing is avilable concernthe detailed anatomical and raographic study of the promandibular joint except e given by (**Miller, Christen and Evans 1964, Douglas and lliamson 1983, Abdel Salam 4 and Dewedar 1988**) on the The present study is an atpt to obtain some informations he anatomical structure and reons of the tempromandibular t of experimental domestic anis and to score the best radiophic picture of the joint as well the surgical approach. In the antime, to stimulate further instigations on clinical cases of mpromandibular joint diseases ich uptill now are neglected.

MATERIAL AND METHODS

Five head from each of cattle, sheep and goat were used for this investigation. Surgical exposure of the tempromandibular joint was accomplished by a preauricular incision along the zygomatic arch, to avoid the branches of the fascial nerve (Fig. 1&3). The whole structure in relation to the tempromandibular joint was carefully dissected and separated by sharp and blunt dissection at both sides of the head. In three spcemins of each species, the synovial membrane of the articular capsule was visualized through an injection mass of coloured gum milk latex. The previously injected specemins were then preserved in the refregerator for about 8 hours and then subjected to carefully dissection to visualize the anatomical features of the joint. Thorough examination of the tempromendibnlar joint and its relations, to the surrounding structures were carried out on both halves of each head, after it was subjeced to a paramedian sections.

Radiographic examination of the tempromandibular joint was studied by performing lateral position, where the interpupillary line is at 45° to the film, for both the whole skull and the sagittally sectioned ones. At first, plain films were taken and then the outline classification of the joint cavity was afforded by intraarticular injection of 3 ml of contrast medium, "urografin"* using a 22 gauge needle. For radiographical plane and contrast film 55 kvp, 200 MA, 1/10 S in small rumenent and 75 KVP, 200 Ma, 1/10 S in cattle exposure factors with 80 cm. FFd. were used.

RESULTS AND DISCUSSION

Surgical exposure of the tempromandibular joint was carried out via a semicircular incision along the zygomatic arch, extending from the lateral aspect of the orbit to a point just anterior to the external auditery meatus (Fig. 3a). A nearly the same site was discribed by **Miller (1964)** in dogs. However, it was found that the joint is covered laterally by the different parts of the masseter muscle, three in sheep, and two in both goat and cattle, **(Nickle, Schummer, Seiferle and Sack 1973)**. Also the joint was covered by the dorsal buccal branch of the fascial nerve (Fig. Ia, b & 3a, b).

The oseous portions of the joint concerned were the caput mandibulae of the condylor process of the mandible and the transversly oriented articular tubercle of the zygomatic process of the temporal bone **(Chauvou, Arling, 1891, Martin, Schrander 1938)**.

a- The condylar process:

It was observed that the articular surface of the condylar process is oval in shape with its larger basal part directed laterally It is slightly convex craniocaudally and often slightly concave from side to side In sheep the condylar process was in the form a spindle, perpendicular to the mandible ramus and the articular tuber slopes more rostrally in the mandibular fossa than in cattle and goat, therfore, the concavity of the mandibular notch was more pronounced in the latter.

b- The tuberculum articulae:

The ventral surface of the zygomatic process of the temporal bone was in the form an oblong dipression slightly concave from before backward and less so from side to side **(Kummer, 1959)**. The result showed that in small ruminant the tuberculum articulae is roughly quadrilateral in outline while in large ruminant it has a cresentic in shape. In both cattle and goat the articular tubercle is well distinct than that of sheep in which it is almost flat. The tubercle leads to a shallow depression, mandibular

fossa, (Hughes, and Dransbield, 1953; Sisson, 1975).

c- The interarticular disc:

It is a dense fibrocartilage and it accentuates the curvature of both articular surfaces as observed by Ziet (1943), in cattle, and May (1970), in sheep. It was found that the disc is relatively thin at its center and increases in thickness toward its prephery. By sagitttal section it was found that the morphology of the disc is concave-convex in contrary to the finding of Raghan and Kachroo (1964) who described it as biconcave. (Fig. 5 a, b, c).

The tempromandibular joint is maintained by the joint capsule, ligaments and by other supporting structures.

a- Joint capsule (Capsula articulata):

It completely encloses the articular surface of the temporal component of the condyle as well as the intermediate disc, in both species, and the free dorsal part of the ramus of the mandible, in cattle only. The articular capsule is formed of two layers:

a- Membrana fibrosa:

In cattle as well as in small ruminants, the lateral part of the capsule was in the form of a strip of fibrous band, spreading from the lateral margin of the articular tubercle rostrally, caudal retroarticular process, articular emenance, the lower surface of the zygomatic process of the temporal bone caudally and in between from the margin of the mandibular fossa. In cattle it was also observed that the fibres radiate ventromedially, while in small ruminants, the fibres were more or less transversaly oriented, However, in both species the fibres terminated on the neck of the mandible. The medial part of the articular capsule actually has its attachment in both species above to the lateral surface of the zygomatic process of the temporal bone, to the fovea ptreygoidea on the medial aspect of the condyler process, with some fibres attached to the medial aspect of the ramus of the mandible. In cattle only, it was noted that this part of the articular capsule gives accessory fibres which continue downwards to the caudal dorsal part of the ramus of the mandible. It is relevant to point out that this part of the articular capsule takes on more of a ribbon like form in case of cattle rather than in case of small ruminants.

b- Membrana synovialis:

It lines the deep surface of the fibrous stratum and was attached to the margins of the upper and lower surface of the articular disc, thus two separete sacs were formed (NAV, 1983). The dorsal sac was

the larger and belongs to the articulation between the interarticular disc and the temporal articular surface and the ventral one belongs to the articulation between the fibrocartilage and the condyle. However, an injection manss has revealed that, on distension, (Fig. 2,a), the dorsal sac creates two irrigular pouches caudal and cranial. The caudal pouch, was the more volumenous and extended on the upper surface of the zygomatic process of the temporal bone where it was partially covered by the fibres of the muscle temporalis and the infraorbital corpus adiposum. The cranial pouch was the smaller of the two pouches, it was located on the temporal process of the zygomatic bone, covered by a loose connective tissues.

2- Ligaments:

By dissection, it was found that the tempromandibular joint in ruminants has tow ligaments; lateralis and caudalis; as mentioned by **Nickle, Schumer and Wilkens (1986). However, Sisson (1975)** stated that the caudal igament was absent in ruminant. The lateral ligament is represented by strong flattened band. In this respect of **Ellenberger/Baun (1943)** reported that the elastic nature of the caudal ligament may protect the joint against the chief pressure for chewing and backward displacement of the mandible.

Radiographic examination of the head of cattle, sheep and goat for the detection of tempromandibular joint by lateral view seems to be beneficial, as it shows the general outline of the joint as well as its articular cavity. However, superimposaition of the adjacent structures masks the detailed description of the joint to a some extent. Difficulties to acheive clear visulization of the joint in the lateral view was due to the presence of the orbital prominence which hinders the direct contact between the head and the film with subsequent superimposaition of the joint of both sides of the head. On the other hand, the 45 oblique lateral view (Fig. 2 b, 6a & b,7a & b) after **Douglas and Williamson (1983)**, in dog, was choosed and it achieves superior visualization of the joint and its cavity: 75 KVP, 200 Ma, 1/10 S. in cattle and 55 KVP, 200 Ma, 1/10 S. in small ruminant gave a good result for radiographic examination of the tempromandibular joint. The use of contrast media proved helpful for diagnostic purposes as it visualizes the joint cavity and counteracts the superimposition of the adjacent structures appearing in the plain film. (Fig. 6b & d).

From the aforementioned results it is suggested that the roomy joint capsule as well as the character of the mandibular fossa play a great role in the horizontal, side to side movement of the joint.

SUMMARY

The present study was carrried out on 5 head specimens each from cattle, sheep and goats of different ages and sexes. The aim of this work was designed to investigat the best site for surgical exposure of the tempromandibular joint, the structure of which was anatomically and radiologicallly described.

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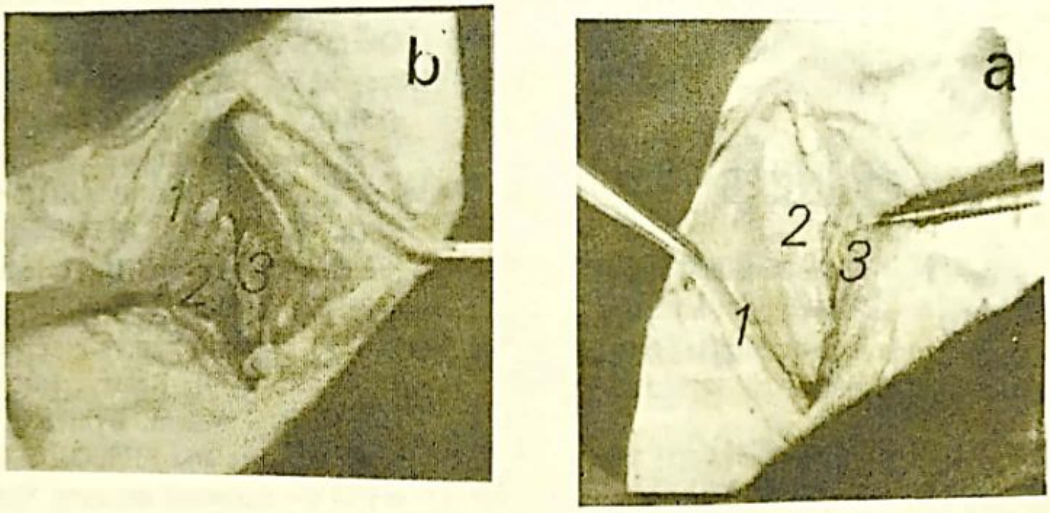

Fig.(1): Incision at the tempromanibular joint of cattle shows:
a&b: l-Platysma layer. 2- First layer of masseter mususcle.
3- Second layer of masseter m.
b: Incision of second layer of masseter m. and appearance of the joint capsule (Arrow).

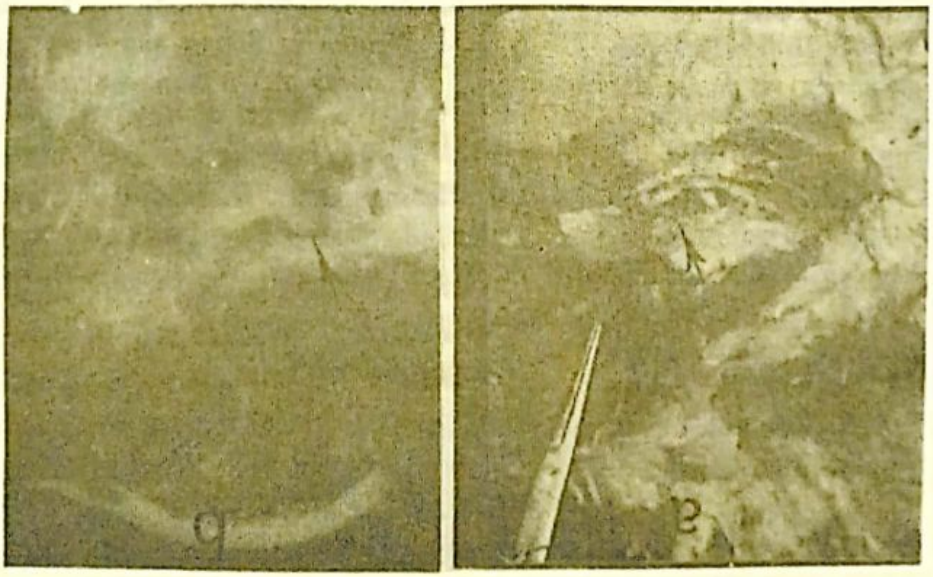

Fig.(2): a- tempromanibular joint of cattle injected with gum milk latex.(Arrow).
b- lRadiographic view of tempomandibular joint cattle.(Arrow).

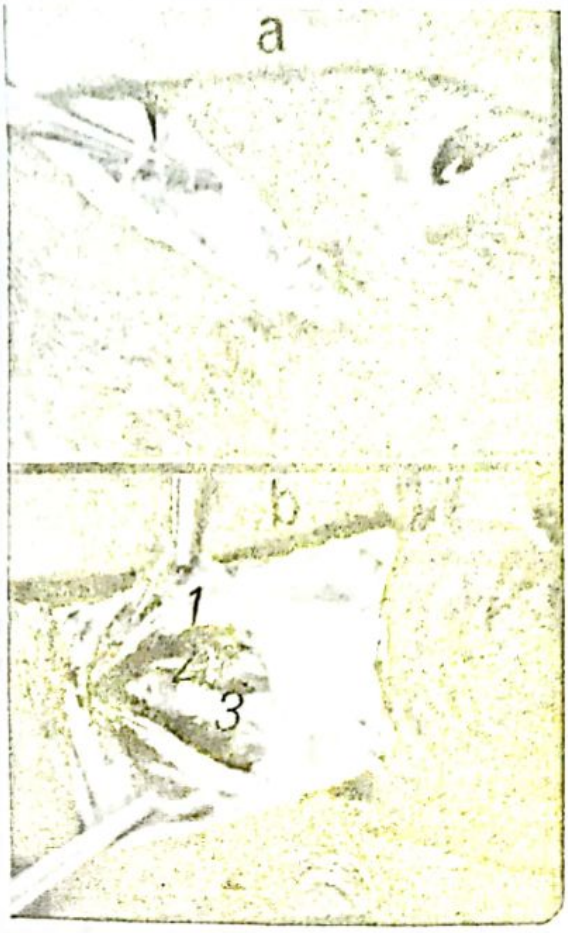

Fig.(3): Fig.(1): Incision at the temporomanibular joint site of sheep shows:
a: After removal of skin.Arrow pointed to the cutaneous blood vessels and nerve(buccal nerve and superfescial temporal a.&n.).
b: 1-First layer of masseter m.
2- Second layer of masseter m.
3- Third layer of masseter m.

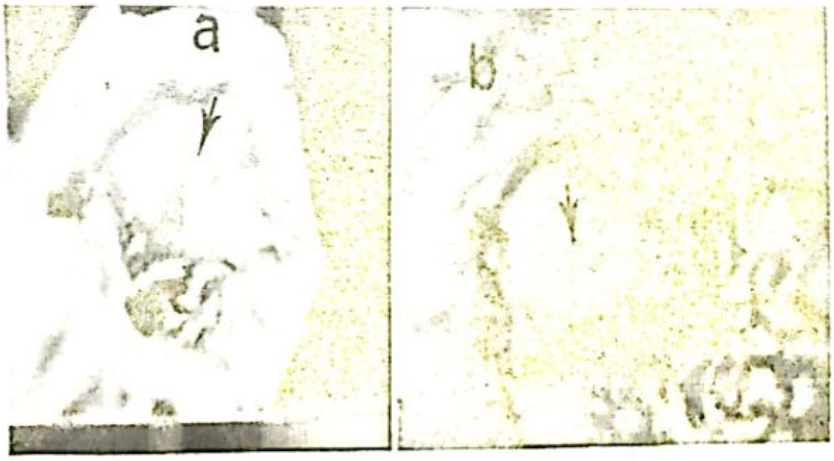

Fig.(4): a- Articular tubercle of cattle.
b- The same of sheep.

Fig.(5): Two articular surfaces in small ruminant.
a- The atricular surfaces with its disc.
b- The same after removal of the disc.
c-The disc.

Fig.(6): Radiographic views of tempromandibular joint in small ruminant:
a-Beor injection with urographin in sheep.
b-Beor injection with urographin in sheep.
c-After injection with urographin in goat.
d-Beor injection with urographin in Goat.