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Areas of Muscular Attachment and their Correlation with Foraminous Areas of the Cervical Vertebrae of the Ox (Bos taurus L.)

By

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With 22 figures

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Introduction and Method

This study is the direct result of findings published earlier in this journal (Smuts, 1974, 1975) on the distribution of the foramina of the cervical vertebrae of the ox. In the description to follow there will of necessity be referred to those publications and illustrations. The questions arising from that study were whether foraminous areas are associated with muscular insertions and whether foramina less than 0.25 mm. in diameter, referred to as pores, harbour bloodvessels, fibres of Sharpey or canals of Volkmann. The latter question is presently being investigated in this department by employing bloodvessel injection and corrosion techniques. This paper deals with the areas of muscular attachment on the cervical vertebrae of the ox and correlates them with the distribution of the foramina.

Fifteen bovine cadavers were preserved by 10 % formalin infusion and the muscles which attach to the cervical vertebrae were dissected to their areas of insertion.

The latter were carefully outlined on the bone with a diamond pencil and the muscle was cut away. The areas so demarcated were plotted in various colours on a series of macerated and defattened bovine cervical vertebrae in order to correlate them with the foramina. It became obvious that inadequate and often contradictory information exists in veterinary literature and textbooks on the exact insertions of the cervical muscles of the ox. Illustrations depicting the areas of muscular attachment on all the cervical vertebrae of the ox could not be found in the literature. In textbooks on veterinary anatomy only Schmaltz (1911) attempted to illustrate all the insertions in the horse. Barone (1966) illustrates the insertions on C 1 and C 2 of the ox, C 1—3 and C 7 of the horse and C 1—2 of the dog. Those illustrated for the ox do not exactly correspond with the results obtained in the present study. Each vertebra will be described in terms of its areas of muscular attachments and foramina, and the individual insertions compared with descriptions in textbooks by Chauveau (1855), Fleming (1891), Chauveau/Arloing (1903), Martin (1904), Martin/Schauder (1938), Ellenberger/Baum (1943), Dobberstein/Koch (1953), Sisson/Grossman (1955), Schwarze (1960), Koch (1960), Dobberstein/Hoffmann (1961), Nickel/Schummer/Seiferle (1961) and Barone (1966, 1968).

Results

1. Atlas, dorsal face

*(a) M. rectus dorsalis minor (1/a)**: It takes origin from an area along the cranial aspect of the dorsal arch and articular fovea, extending as far caudally as the craniolateral surface of the dorsal tubercle. Notable foramina are found in this area especially along the cranial aspect of the dorsal tubercle. Pores cover the corresponding region and occur along the cranial edge.

(b) M. obliquus capitis caudalis (1/b): This muscle inserts over an extensive area covering most of the wing, allowing for the common opening of the lateral vertebral and alar foramina mediocranially. The large, fairly constant foramen situated caudally to the alar foramen is included in this area. Apart from a number of small to very small openings along the cranial, caudal and lateral borders of the wing, this area is relatively free of foramina, with porous areas being a more constant feature.

(c) Mm. intertransversarii dorsales cervicis (1/c): They attach to an elongated area along the caudomedial angle of the wing (SMUTS, 1976). Only pores are found here. No descriptions in textbooks on comparative veterinary anatomy mention the atlas as a point of insertion of these muscles.

(d) M. obliquus capitis cranialis (1/d): A number of fascicles take origin from the craniolateral edge of the wing. A few small to very small foramina as well as pores occur in this area.

2. Atlas, lateral face (edge of the wing)

(a) M. obliquus capitis cranialis (2/d): The area described on the dorsal face continues caudally to cover the cranial third of the edge of the wing. Only pores are found here.

(b) M. longissimus atlantis (2/e): This muscle inserts by means of a firm tendon on an area measuring 10 × 3 mm. situated caudally to that of the M. obliquus capitis cran. and directly ventral to the insertion of the caudal oblique capital muscle. The area is porous.

(c) M. semispinalis capitis (2/f): The most cranial slip of this muscle arises directly ventrally to the attachment of the M. longissimus atlantis. A number of pores are found here. No textbook mentions an atlantal attachment for this muscle.

(d) M. omotransversarius (2/g): It attaches by means of a flat tendon to the edge of the wing, caudal to the previous two muscles, and cranially and ventrally to the area occupied by the ventral intertransverse muscles. The narrow line of insertion is 3 cm. long. The surface contains a few pores but no foramina.

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a = M. rectus capitis dorsalis minor, a′ = M. rectus capitis dorsalis major, b = M. obliquus capitis caudalis, c = Mm. intertransversarii dorsales cervicis, c′ = Mm. intertransversarii ventrales cervicis — Pars medialis, c″ = Mm. intertransversarii ventrales cervicis — Pars lateralis, d = M. obliquus capitis cranialis, e = M. longissimus atlantis, f = M. semispinalis capitis, g = M. omotransversarius, h = M. splenius cervicis, i = M. rectus capitis lateralis, j = M. rectus capitis ventralis, k = M. longus colli, l = Mm. interspinales, m = M. spinalis et semispinalis cervicis, n = M. rotator, o = Mm. multifidi — superficial fascicles, o′ = Mm. multifidi — deep fascicles, p = M. longissimus capitis, q = M. longissimus cervicis, r = M. iliocostalis thoracis, s = M. serratus ventralis, t = Mm. scaleni, u = M. longus capitis

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* References to figures appear in parenthesis. The number preceding the oblique dash refers to the figure; the letter which follows the oblique dash refers to the part labelled in that figure.

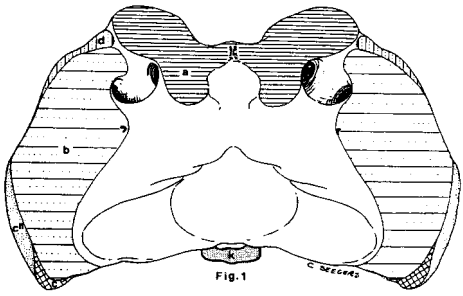

Fig. 1. Atlas, dorsal aspect

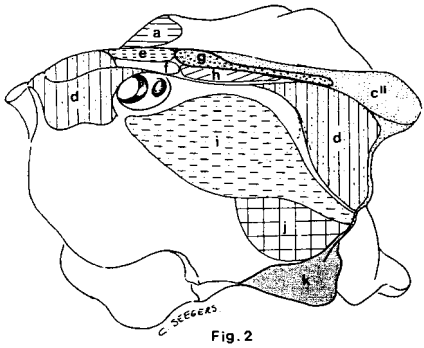

Fig. 2. Atlas, lateral aspect

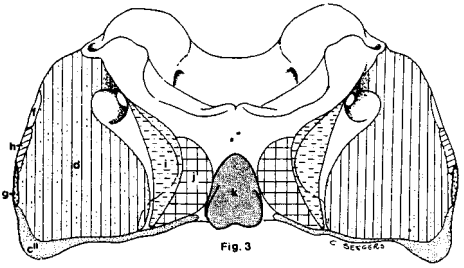

Fig. 3. Atlas, ventral aspect

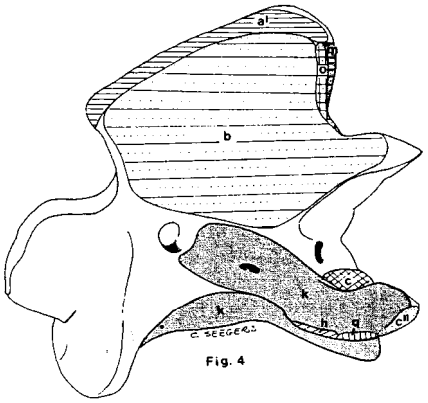

Fig. 4. Axis, lateral aspect

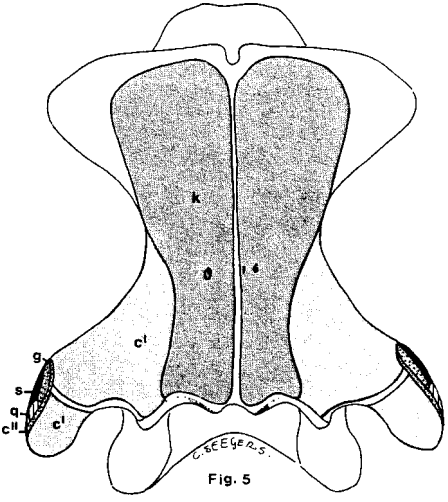

Fig. 5. Axis, ventral aspect

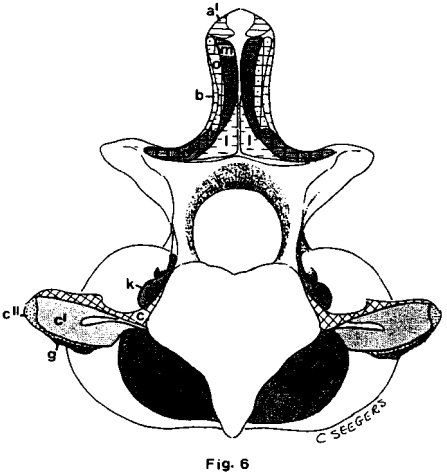

Fig. 6. Axis, caudal aspect

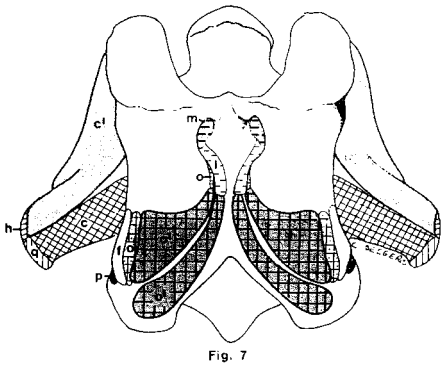

Fig. 7. C 3, dorsal aspect

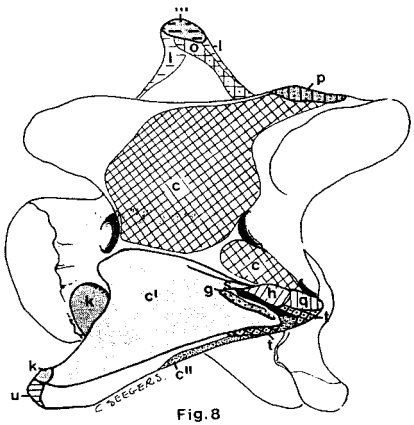

Fig. 8. C 3, lateral aspect

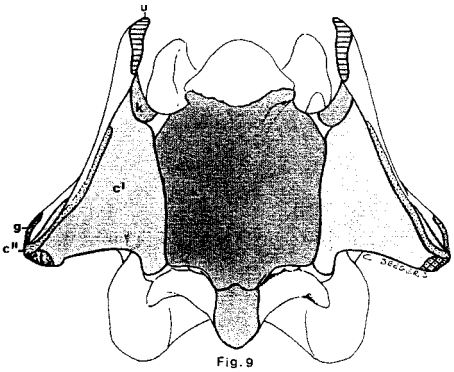

Fig. 9. C 3, ventral aspect

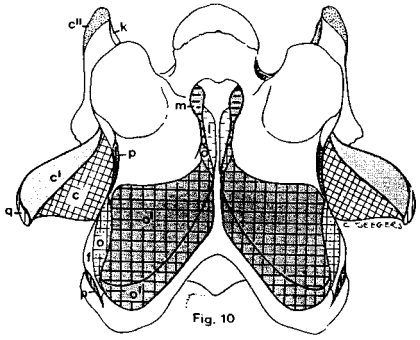

Fig. 10. C 4, dorsal aspect

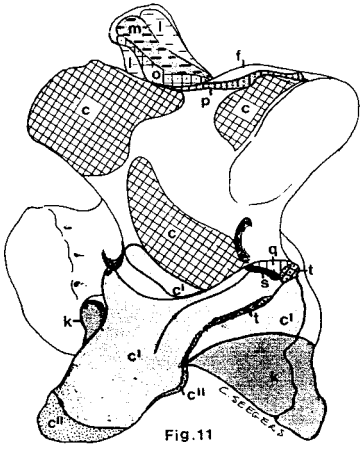

Fig. 11. C 4, lateral aspect

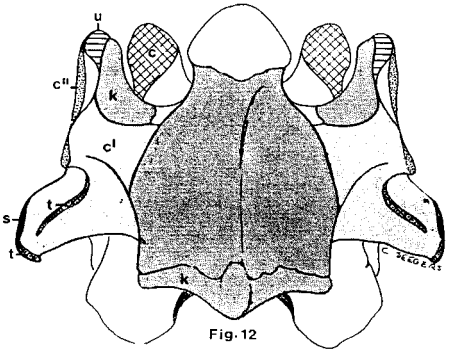

Fig. 12. C 4, ventral aspect

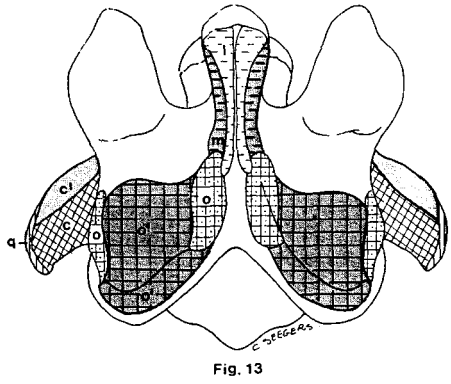

Fig. 13. C 5, dorsal aspect

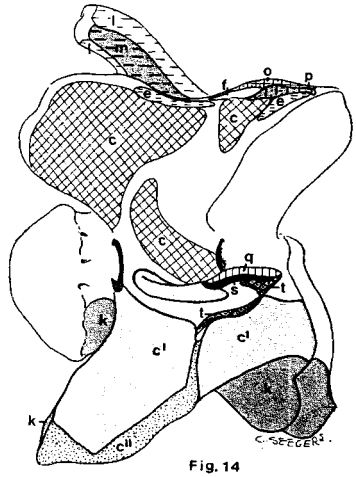

Fig. 14. C 5, lateral aspect

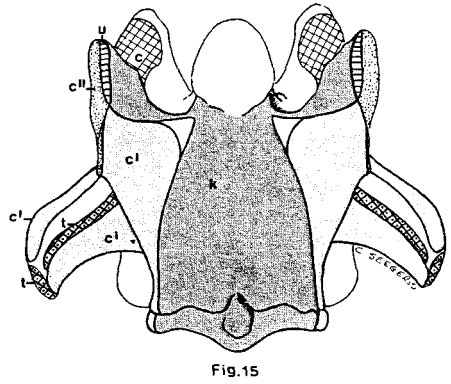

Fig. 15. C 5, ventral aspect

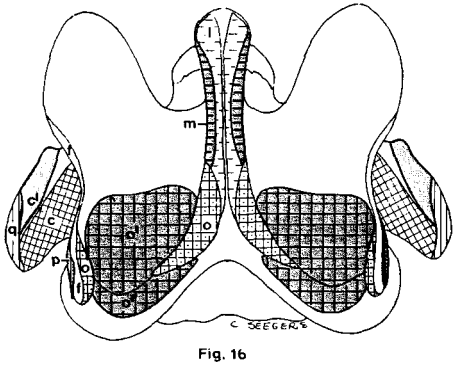

Fig. 16. C 6, dorsal aspect

(e) M. splenius cervicis (2/h): The tendinous attachment is ventral and parallel to the insertion of the M. omotransversarius. Small foramina and pores may occur.

(f) Mm. intertransversarii ventrales cervicis — Pars lateralis (2, 3/c″): The most cranial fascicles of these muscles (SMUTS, 1976) attach along an extensive area covering the caudal half of the lateral edge of the wing. It is continued along the ventrocaudal border as far as the ventral tubercle. Small to very small foramina and pores are present here.

3. Atlas, ventral face

(a) M. obliquus capitis cranialis (2, 3/d): It arises from the ventral surface of the wing of the atlas. A wedge-shaped area, with its base lying around the alar foramen, separates it from the area of attachment occupied by the M. rectus capitis lateralis (2, 3/i). Foramina and pores are present in the atlantal fossa and along the surface cranial to the alar foramen as well as along the area caudal to the fossa.

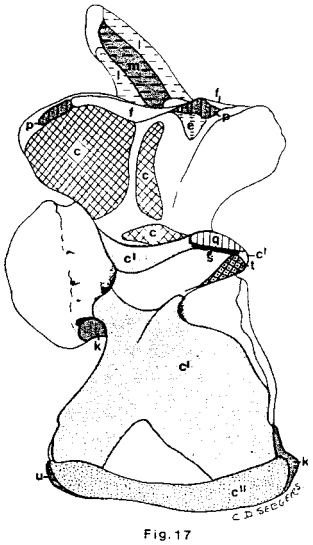

Fig. 17

Fig. 17. C 6, lateral aspect

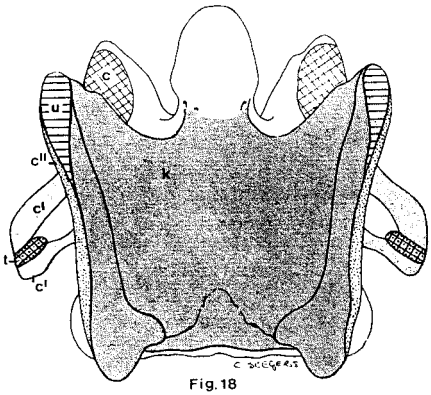

Fig. 18

Fig. 18. C 6, ventral aspect

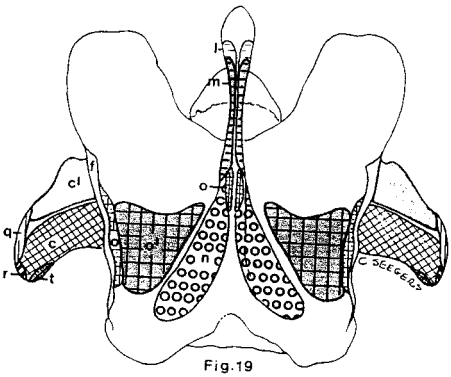

Fig. 19

Fig. 19. C 7, dorsal aspect

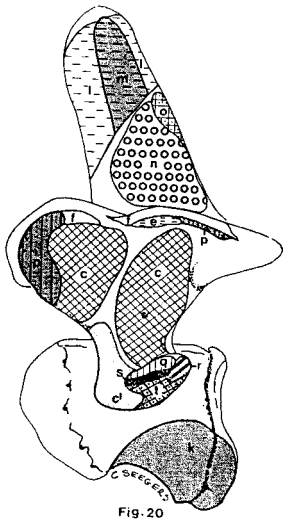

Fig. 20

Fig. 20. C 7, lateral aspect

(b) M. rectus capitis lateralis (2, 3/i): It attaches to a fairly extensive area situated caudally to the cranial articular fovea and along the medial edge of the alar foramen. In addition fibres arise from the medial part of the atlantal fossa and the adjacent surface of the ventral arch laterally to the M. rectus capitis ventralis (2, 3/j). A foraminous area with pores constantly occurs in the atlantal fossa.

(c) M. rectus capitis ventralis (2, 3/j): The muscle arises from the arch medial to the M. rectus capitis lat. and lateral to the ventral tubercle. A number of small to very small foramina and pores occur here.

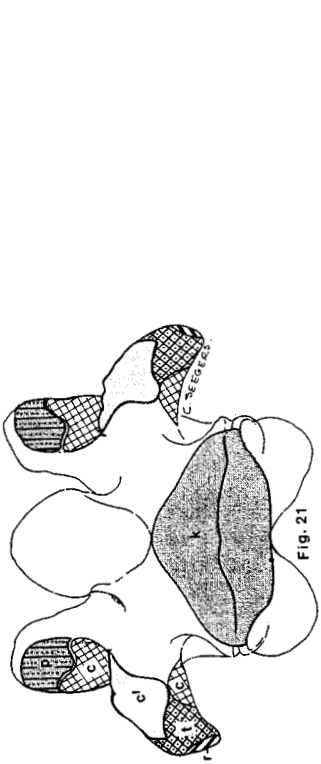

Fig. 21. C 7, ventral aspect

Fig. 22. Dorsolateral view of cervical vertebral column with areas of muscular attachment

(d) M. longus colli (2, 3/k): The attachment covers the ventral tubercle. This area is always strongly porous with two to eight additional foramina of medium to very small size, arranged mainly cranial and lateral to the area of insertion.

(e) Mm. intertransversarii ventrales cervicis (2, 3/c″); The insertion has been described (vide supra). Very small foramina and pores are present in this area.

4. Cervical vertebrae 2—7

(a) M. rectus capitis dorsalis major (4/a'): It arises from the entire length of the dorsal surface of the spinous process of C 2 on either side of the Lig. nuchae. Foramina, mostly of very small calibre, and accompanied by pores, occur in this area. In addition two to four large foramina may be present.

(b) M. obliquus capitis caudalis (4/b): The area of origin on the axis is extensive. It covers the lateral surface of the spinous process, the lamina as far ventralward as the lateral vertebral foramen, and the dorsal surface of the caudal articular process. The free borders of the lateral surface are always porous and show a variable number of very small openings. An extensive porous area stretches across the middle area of this surface. One or two very small openings are occasionally situated in the middle of the lateral surface.

(c) Mm. interspinales (/l): These paired fleshy muscles stretch on either side of the Ligg. interspinalia between the spinous processes of contiguous vertebrae from C2—T1. The most cranial fascicles insert on a triangular area at the base of the caudal surface of the spinous process of C 2 on either side of the ligamentum nuchae (6/l). Pores and foramina varying from medium to very small occur here. On C 3— C7 the attachment areas cover the craniolateral and caudolateral aspects of the spinous processes and become progressively more extensive caudally in relation to the increasing height of the spinous processes. The free extremities of the latter serve as attachment areas for the ligamentum nuchae. The attachment areas always contain pores. Foramina, medium to very small, occur along the cranial and caudal aspects of the spinous processes. They are more numerous and prominent in C3—C 5 than in the last two cervical vertebrae.

(d) M. spinalis et semispinalis cervicis: This muscle attaches to the spinous processes of the last six cervical vertebrae. The most cranial insertion is along the distal two thirds of the caudal surface of the spinous process of the axis (6/m), on either side of the ligamentum nuchae, directly above the insertion of the Mm. interspinales. From C 3—C 7 the attachment area is along the lateral surface of the spinous process. In C 3 (7,8/m) the area is small and situated on the lateral aspect of the distal expansion. In C 4—C 6 it stretches along most of the length of the spinous process, while in C 7 the attachment is to the caudal aspect of the distal half of the lateral surface (19, 20/m). The attachment areas contain pores, but very few foramina.

(e) M. rotatoris (19, 20/n): The most cranial fascicle of the Mm. rotatores attaches to C 7 along an extensive wedge—shaped area covering most of the lateral surface of the base of the spinous process, extending onto the lamina caudally. This surface is smooth, with a number of pores present along the caudoventral aspect.

(f) Mm. multifidi: The cervical part extends from C 2 — C 7. It consists of superficial craniomedially directed fascicles running between the caudal articular and the spinous processes, and deep fleshy bundles extending between contiguous laminae from C 2 — C 7. The *superficial fascicles* arise from the medial aspect of the tubercle near the caudal articular process, bypass as many as four segments, and insert ventrally along the lateral and caudal face of the spinous process. On the axis the area of insertion lies between the M. spinalis et semispinalis medially and the M. obliquus capitis caudalis cranially (4, 6/0).

It covers the caudolateral border of the spinous process. The attachments to C 3 (8/0) and C 4 (10, 11/0) lie ventrally and caudally to the M. spinalis et semispinalis and extend along the laterocaudal face of the spinous process to the dorsomedial surface of the lamina (13, 16/0). A fascicle arising from

T 3 occupies an oval area on the middle of the caudolateral border of the spinous process of C 7 (19, 20/0). The *deep fascicles* insert cranially along the mediocaudal aspect of the caudal articular process of C 2 (6/0′). The most cranial fascicle (7/0′) arises from an area which covers the dorsal surface of the lamina of C 3 from the level behind the depression occurring there to the middle of the caudal articular process. It is separated by a narrow interval from the insertion area of the fascicle arising from C 4. On C 4 the two areas are continuous and cover the caudal half of the dorsal surface of the lamina (10/0′). On C 5 and C 6 the insertion of the superficial part (13/0; 16/0) dovetails medially between the areas of origin and insertion of the deep fascicles (13/0′; 16/0′). The fascicle on C 7 arises from the middle of the dorsal surface of the lamina (19/0′). The insertion areas of the Mm. multifidi on the axis always show pores, and one to three medium to small foramina may occur. In the other vertebrae the areas contain pores but very few foramina.

Nowhere in the literature could any reference be found to the deep fascicles of these muscles.

(g) M. semispinalis capitis: Tendinous fascicles arise from C3—C 7. The origin on C 3 (7, 8/f) is from the tubercle on the craniodorsal aspect of the caudal articular process between the Mm. multifidi medially and the M. longissimus capitis laterally. On C 4 and C 5 the areas are similar (10, 11/f; 14/f). The origin on C 6 is more extensive. It covers the laterodorsal borders of both articular processes, including the connecting ridge (16, 17/f). A similar area is found on C 7, but an interval separates the small area on the cranial articular process from the more extensive origin on the connecting ridge behind it (19, 20/f). The areas of attachment show pores.

(h) M. longissimus capitis: The muscle attaches by means of tendinous or aponeurotic slips to the caudal articular processes of C 3—C 5 and to the cranial and caudal articular processes of C 6 and C 7. On C 3 (8/p) the attachment is directly lateral to the M. semispinalis capitis along the lateral face of the tubercle situated on the dorsal aspect of the caudal articular process. On C4 (11/p) the line of attachment extends to the level of the cranial articular process. The attachment to C 5 (14/p) is along a line caudoventrally to the insertion of the M. semispinalis on the lateral face of the caudal articular process. On C 6 (17/p) and C 7 (20, 21/p) the caudal areas are situated along the lateral surface of the caudal articular process. The cranial area on C 6 is along the craniodorsal border of the lateral surface of the cranial articular process, in front of the M. semispinalis capitis, while a more extensive attachment on C 7 covers the cranial third of the lateral surface of the articular process. The attachment areas contain pores.

Most authors describe the M. longissimus capitis et atlantis as a single muscle. In the present study they were clearly separable and did not arise from the same vertebrae.

(i) M. longissismus atlantis: This muscle arises by means of slender tendons from the cranial and caudal articular processes of C 5 (14/e), the caudal articular process of C 6 (17/e), and the lateral surface of the lamina of C 7 (20/e). They are separable from the tendons of origin of the M. longissimus capitis. The attachment areas contain pores.

These observations differ from descriptions found in standard textbooks. The atlantal and capital muscles are mostly described as one entity arising from the articular processes of C 3— C7.

(j) Mm. intertransversarii cervicis: Mm. intertransversarii dorsales cervicis: On the axis the attachment area is caudally on the dorsomedial surface of the transverse process (4, 6/c), directly medial to the M. longus colli. On

C 3 there are two areas of attachment (7, 8/c): The lateral face of the lamina and the caudal half of the dorsal surface of the transverse process (dorsal tubercle). On C 4 three attachment areas occur (10, 11/c): the lateral surface of the cranial articular process, an oblong region laterally in front of the caudal articular surface, and an area which covers the craniolateral aspect of the lamina and the caudal two-thirds of the dorsal surface of the transverse process (dorsal tubercle). On C 5 the picture is very similar to C 4 (13, 14, 15/c). There are three areas of attachment on C 6 (16, 17, 18/c): the lateral surface of the cranial articular process, the lamina, and the caudal three—quarters of the dorsal surface of the transverse process. On C 7 (19, 20, 21/c) the muscles attach along the caudal two—thirds of the lateral face of the cranial articular process as well as to the caudal half of the dorsal and ventral surfaces of the transverse process and the lateral face of the lamina.

Mm. intertransversarii ventrales cervicis — Pars medialis: On the axis (5, 6/c′) the ventral surface of the transverse process and the adjacent part of the vertebral body provide attachment for the fleshy cranial fascicles of these muscles. The ventral ramus of spinal nerve No. 3 separates the larger mediocranial area from the caudal one. On C 3 (7, 8, 9/c′) a fascicle arises along the craniolateral surface of the transverse process including the cranial half of the dorsal aspect of the dorsal tubercle. A second area of attachment covers the ventral surface of the transverse process, lateral to the M. longus colli. On C 4 (10, 11, 12/c′) the muscles attach dorsally and ventrally to the cranial third of the dorsal tubercle and to the craniolateral surface of the ventral tubercle. In addition, the caudoventral aspect of the dorsal tubercle including the entire fossa occurring there are covered. There is an extensive area of attachment on C 5. It covers the cranial, lateral, caudomedial and caudolateral surfaces of both tubercles of the transverse process (13, 14, 15/c′). On C 6 16, 17, 18/c′) there are attachments along the craniodorsal and -ventral surfaces of the dorsal tubercle. From the caudoventral border of the latter it extends over the greater part of the cranial and lateral surfaces of the lamina of the transverse process. The area on C 7 (19, 20, 21/c′) covers the cranial half of the dorsal and ventral surfaces of the transverse process.

Pars lateralis: The most cranial fascicles insert on the ventrocaudal surface of the pointed extremity of the transverse process of the axis (4/c″), and along a line which runs cranialward along the ventral edge of the process. The attachment is medial to the insertions of the M. longissimus cervicis and omotransversarius, and lateral to the medial part of the ventral intertransverse muscles (5/c″). On C 3 (8, 9/c″) there is a broad flattened musculotendinous insertion covering the caudal two-thirds of the ridge connecting the dorsal and ventral tubercles. There are two areas of attachment on C 4, (10, 11, 12/c″): the caudal edge of the ventral tubercle and the craniolateral aspect of the pointed extremity of the ventral tubercle. On C 5 (14, 15/c″) the muscles attach laterally along the ventral margin of the ventral tubercle of the transverse process as well as along the line connecting the tubercles. The caudal fascicles of the lateral part arise laterally along the ventral border of the lamina of C 6 (17, 18/c″).

Where the insertion areas cover the lateral surface of articular processes, pores are always present. In contrast, the lateral surface of the laminae where no muscle fascicles attach, is smooth. The transverse processes contain pores. Foraminous areas are always present in the concavity between the dorsal and ventral tubercles. These openings are mostly of small diameter. In young specimens only pores occur. In C 7 a large foramen is present on the lateral face of the pedicle, within the attachment area of the dorsal intertransversarii.

(k) M. splenius cervicis: There are slender tendinous insertions on the transverse processes of C 2 and C 3. On the axis (4/h) it attaches along the cranial third of the ventral border in front of the M. longissimus cervicis. On C 3 the attachment is to the cranial aspect of the free extremity of the dorsal tubercle (7, 8/h). Only pores are found in these areas.

(l) M. longissimus cervicis: This muscle attaches by means of firm tendons to the transverse processes of C 2—C 7. On the axis (4, 5/q) the insertion is to the middle of the ventral edge directly caudal to that of the M. splenius cervicis. On C 3 the attachment is to the caudodorsal aspect of the free extremity of the transverse process (dorsal tubercle) behind that of the M. splenius cervicis (7, 8/q). On C 4 — C 7 the insertion areas are along the dorsal aspect of the free extremities, intimately associated laterally with the tendons of insertion of the M. serratus ventralis. These areas contain pores.

(m) M. serratus ventralis cervicis: There are slim lines of insertion on the transverse processes of C 2 — C 7. On C 2 (5/s) it attaches to the cranial third of the ventral border and on C 3 (8/s) along the cranioventral border of the free extremity of the dorsal tubercle. The tendons are partly fused medially to those of the M. splenius cervicis. On the other cervical vertebrae the insertion is directly ventrally to that of the M. longissimus cervicis, along the free extremity of the dorsal tubercle of the transverse process. These areas contain pores.

(n) M. iliocostalis thoracis (20, 21/r): The most cranial insertion of this muscle is on the caudal aspect of the transverse process of C 7. Only pores are found here.

(o) M. omotransversarius: Apart from the insertion on the wing of the atlas, there is a slender aponeurotic attachment to the transverse processes of C 2 and C 3. On C 2 (5, 6/g) the attachment is along the cranial third of the medioventral border of the transverse process. The insertion is not constant. On C 3 (8, 9/g) it inserts along the cranioventral aspect of the free extremity of the dorsal tubercle. Pores occur along these areas.

(p) Mm. scaleni: The scaleni attach along the transverse processes of C3—C 7. On C 3 (8, 9/t) there are two areas of insertion. The superficial part of the middle scalene attaches to the caudal aspect of the free extremity of the dorsal tubercle; the M. scalenus ventralis inserts slightly more ventrally, along the ridge connecting the dorsal and ventral tubercles. On C 4 (11, 12/t) fascicles of the ventral and dorsal muscles attach to the caudal surface of the free extremity of the transverse process (dorsal tubercle). On C 5 (14, 15/t) the same area is occupied by these muscles with an additional linear area along the ventral aspect of the dorsal tubercle. On C 6, (17, 18/t) the M. scalenus ventralis inserts on the caudoventral surface of the free extremity of the transverse process. The insertion area on C 7 (20, 21/t) is more extensive than on the preceding vertebrae because the middle and ventral scalene muscles have fleshy attachments to the ventrocaudal and lateral aspect of the free extremity of the transverse process. Pores are present in most of these attachment areas. A number of small—sized foramina may be present on C 7. The scaleni are described in detail by SMUTS/LE ROUX (1975).

(q) M. longus capitis: This muscle arises from the mediocranial aspect of the pointed extremity of the ventral tubercle of the transverse processes from C 3 — C 6. Pores occur along these areas.

(r) M. longus colli: Fascicles of this muscle attach to all the cervical vertebrae. On the axis there are two areas: a fascicle takes origin from the dorsal surface of the transverse process and the lateral surface of the pedicle caudal to the lateral vertebral foramen (4/k). Another portion attaches to the ven-

tral surface of the body (5/k.). The attachments to C 3 — C 5 are very similar. They cover the mediocranial aspect of the ventral tubercles of the transverse processes as well as the ventral surface of the vertebral bodies, including the caudal epiphyses. On C 6 the area of attachment covers the entire ventral surface of the body and the medial surface of the lamina of the transverse processes (18/k.). On C 7 the muscle attaches to the ventral and caudolateral surfaces of the body of the vertebrae (20, 21/k.). The most conspicuous foramina of the cervical vertebrae are found on the ventral surface of the body along the cranial and caudal epiphysial lines. Apart from the more laterally situated foramina they are within the attachment area of this muscle. They are usually accompanied by pores.

Discussion

In correlating the areas of muscular attachment with the foramina of the cervical vertebrae, it strikes one that the most prominent vascular foramina are present at points of fleshy muscular attachment to bone. They are mainly confined to the regions along the base of the transverse processes, and laterally and ventrally on the vertebral bodies as well as along the epiphysial lines. These areas coincide mainly with the insertions of the M. longus colli and the ventral intertransverse muscles. Where the insertions are of a tendinous nature, pores are dominant e. g. along the borders of the transverse processes and the wing of the atlas. The location of the vascular foramina suggests that the vessels enter or leave around the circumference but particularly close to the base of the transverse process. They are probably mainly derived from muscular vascular plexuses and from neighbouring systemic vessels. In order to reach finality on this matter further studies are in progress. During the course of the study new information was gathered in regard to certain muscles which attach in the cervical region. The M. semispinalis capitis and the dorsal cervical intertransverse muscles were found to have atlantal attachments. The cervical multifidi show a distinct layer of deep fascicles extending between the vertebral arches. The M. longissimus capitis et atlantis is clearly separable into two muscles with different points of attachment. The Mm. interspinales regularly occur from the level of the axis to the last cervical vertebra. The attachment areas for the Mm. rotatores, spinalis et semispinalis cervicis, splenius cervicis, semispinalis capitis, omotransversarius, longus colli, and longus capitis have been determined more accurately.

Summary

The cervical muscles of the ox were dissected in 15 specimens. The areas of attachment on the cervical vertebrae are described, illustrated, and correlated with the foraminous areas of the vertebrae. The most prominent vascular foramina are present at points of fleshy muscular attachment to bone, Compared with the descriptions in the literature, the insertions of several muscles are described more accurately.

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Zusammenfassung

Muskelinsertionsareale und deren Beziehung zu Porenarealen der Halswirbel beim Rind (Bos taurus L.)

An 15 Rindern wurden die Halsmuskeln präpariert. Ihre Insertionsareale an den Halswirbeln werden beschrieben und abgebildet. Die Beziehungen der Insertionsareale zu den Porenarealen sind derart, daß die größten Gefäßlöcher an den Stellen eines fleischigen Ansatzes liegen. Im Vergleich zu Literaturangaben konnten die Insertionen mehrerer Muskeln genauer als bisher beschrieben werden.

Résumé

Surfaces d'insertions musculaires sur les vertèbres cervicales du Boeuf (Bos taurus L.) et leurs relations avec les trous vasculaires

Les muscles cervicaux du Boeuf ont été disséqués sur quinze spécimens. Les surfaces d'insertions sur les vertèbres cervicales sont décrites, illustrées et comparées aux surfaces qui présentent les trous vasculaires des vertèbres. Les orifices vasculaires principaux se trouvent aux points d'insertion des parties charnues des muscles sur les os. Les insertions de quelques muscles sont décrites de façon plus précise que dans les traveaux relevés dans la bibliographie.

Resumen

Areas de inserción muscular y su relación con áreas foraminadas en las vértebras cervicales del buey (Bos taurus L.)

En 15 bueyes se disecaron los músculos del cuello. Se describen y se retratan sus inserciones en la columna cervical. Las relaciones entre áreas de inserción y áreas foraminadas en las vértebras cervicales demuestran, que los agujeros vasculares más grandes se encuentran en los sitios de inserciones musculares. En comparación con los datos bibliográficos corrientes, se aclaron algunas inserciones de varios músculos en forma más precisa.

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