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ANATOMİ LİTERATÜRÜNDE DİŞ YAPISINDAN BAĞIMSIZ OLARAK KULLANILAN "DENS" TERİMLERİNİN İNCELENMESİ

EXAMINATION OF "DENS" TERMS USED INDEPENDENTLY OF TOOTH STRUCTURE IN THE ANATOMY LITERATURE

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ÖZET

AMAÇ: Anatomi terimi olarak kullanılan "dens" kelimesi çoğu zaman diş anlamının dışında kullanılmaktadır. Bu çalışmada asıl anlamı dışında kullanılan dens terimlerinin Latince terminolojisini incelemek ve Türkçe karşılıklarını belirlemek amaçlanmıştır.

GEREÇ VE YÖNTEM: Terminologia Anatomica ve diğer anatomik terminolojiyle ilgili güncel literatür tarandı ve gerçek anlamı dışında kullanılan "dens" terimleri belirlendi. Elde edilen "dens" terimleri; köken, derece ve şekil açısından değerlendirildi. Anatomi terimleri içerisinde bulunan "dens" kelimesinin dişin anatomik yapısıyla olan benzerlik ve farklılıkları belirlendi.

BULGULAR: Güncel anatomi kaynaklarının taranması sonucu asıl anlamı dışında kullanılan 23 adet "dens" kelimesi tespit edildi. Tespit edilen "Dens" kelimelerinin 15 tanesi sıfat yapısındaki terimlerde kullanıldığı görülmektedir.

SONUÇ: Bu çalışmada anatomi terimleri içerisinde kullanılan "dens" kelimesinin çekimleri, birlikte kullanıldığını terimler hakkında bilgi sunmakta ve dens kelimesinin eğitimci ve öğrenciler tarafından daha net anlaşılacağı kanısındayız. Ayrıca bu çalışmanın Türkiye'de terminoloji konusunda yapılacak olan çalışmalara yol gösterici olacağı düşüncesindeyiz.

ANAHTAR KELİMELER: Anatomi, Dens, Terminoloji.

ABSTRACT

OBJECTIVE: EThe word "dens", which is used as an anatomy term, is often used beyond its primary meaning of "tooth." In this study, it is aimed to examine the Latin terminology of dens terms used in contexts other than its original meaning and to determine their Turkish equivalents.

MATERIAL AND METHODS: The current literature on Terminologia Anatomica and other anatomical terminology was reviewed, and the terms "dens", which were used beyond their literal meaning, were determined. The obtained "dens" terms; were evaluated in terms of origin, grade and shape. The similarities and differences between the word "dens" within anatomy terminology and the anatomical structure of the tooth were determined.

RESULTS: As a result of scanning current anatomy resources, 23 "dens" words that were used outside of their original meaning were identified. It is seen that 15 of the identified "Dens" words are used in terms with an adjective structure.

CONCLUSIONS: In this study, we provide information about the conjugation of the word "dens" used in anatomy terms and the terms used together, and we believe that the word dens will be understood more clearly by educators and students. In addition, we think that this study will be a guide for the studies to be carried out on terminology in Turkey.

KEYWORDS: Anatomy, Dens, Terminology.

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INTRODUCTION

Word nomenclature and terminology are two fundamental tools to make anatomy understandable. Word nomenclature should be precise, concise, globally accepted and approved (1). This prevents possible misunderstanding and misinterpretation among experts. Terminology is defined as a standardized, normalized system of terms used in the scientific field, organized according to certain classification principles (2). The history of anatomical terminology is more than two thousand five hundred years old and dates back to Ancient Greece and Rome (3).

The branch of science that investigates the origin of anatomical terms and the word groups derived from this origin is called etymology (etymologia) (4, 5). When the etymology of anatomical terms is examined, it is seen that the location, function, size, shape of the structure to be named and sometimes its similarity to plant or animal structures are taken into consideration (6). Although most anatomical terms originate from Greek and Latin languages, they have different meanings (7). Therefore, anatomy education can sometimes be a problem for students studying medicine or health-related branches to learn and understand (7, 8). In order to overcome this problem, terminology knowledge is of great importance in understanding the features of the language, the root of the words and how the suffixes are used. Knowledge of terminology also contributes to the correct production of new terms (9, 10).

It is seen that the word "dens", which is related to tooth structure, is frequently used as an anatomy term other than its original meaning. Our aim in this study was to examine the Latin terminology of the word "dens" used in anatomy terminology and to determine its Turkish equivalents. In addition, it was aimed to grouping the anatomical structures named with the word dens by examining their similarities to dental structures or structures associated with dental structures.

MATERIALS AND METHODS

Study Design and Data Collection

The study was conducted by two researchers between January and June 2023. Terminologia Anatomica (TA), where updated and comprehensive lists of anatomical terms are published, was scanned (11, 12). In these scans, anatomical terms that are not related to tooth structure but include "dens" and their conjugations are recorded; evaluated in terms of origin, degree and shape. As a result of the evaluations, the main structures containing the word "dens" were grouped and their similarities and differences with the anatomical structure of the tooth were explained.

Linguistic Analysis of the Word "Dens"

The noun stem of the word "dens" is "dent", and it can become an adjective like "dentalis" (for masculine and feminine) and "dentale" (for genderless) by adding "-alis, -ale". Although Latin has rules of noun declension, there are terms that do not follow this rule. If the nominativus of a noun is monosyllabic and ends in "s", it does not follow the Latin rules of noun declension. The word "dens" also does not follow this rule and its plural genetivus ends not with "mm" but with "ium" and is conjugated just like a noun that cannot be plural (12). The inflectional forms of the word "dens" are given in the **Table 1**.

Table 1: Conjugations of the word "dens"

INFLECTIONAL FORMS OF THE NAME	Singularis	Pluralis
Nominativus	Dens	Dentes
Genitivus	Dentis	Dentium
Dativus	Denti	Dentibus
Accusativus	Dentem	Dentes
Ablativus	Dente	Dentibus

It is also seen that new words are derived using the word "dens". Some words derived from the word dens are listed as follows;
dens, dentis (m) : tooth
dentalis, to : of or pertaining to the tooth, dental
dentatus, -a, -um : toothed. Example nucleus dentatus
denticulus, -a, -um : denticle
dentinum, -i (n)-: dentin
dentitio, -onis (f) : tooth eruption, tooth row
There are also some words in the anatomy literature that are not derived from the word "dens" but have the meaning of "dens". Examples of these words are serratus (serrata, serratium: saw-like, toothed) and odous (odontus: tooth).

Exclusion Criteria

Anatomical terms that are related to tooth structure and include inflections of the word "dens" were not included in the study. In addition,

words such as ascendens, descendens, pudentus, which are not related to tooth structure but contain the word "dens", and the word "densus, -a, -um (frequent, dense)", which is similar to the word "dens", were not included in the study. The list of excluded words is given in **Table 2** (12, 13).

Table 2: List of words not included in the study

Terms related to tooth structure and excluded	Terms excluded including the word "dens" but not related to tooth structure	Densus, -a, -um (frequent, intense) to terms excluded as containing the structure
Plexus dentalis superior	Ascendens	Macula densa
Plexus dentalis inferior	Descendens	Densitas subaxolemmalis
Radix dentis	**Includens**	Linea densa major
Dentes incisivi	Splendens	Linea densa minor
Dentes canini	Arteria pharyngea ascendens	Densitas axolemmalis nodi
Dentes molares	Cervicalis ascendens	Divisio lineae densae majoris
Corona dentis	Neuron amacrinum campi lati substantiam P includens	Vesicula densonuclearis parva
Pulpa dentis	Linea splendens	Vesicula densonuclearis magna
Foramen apicis dentis	Rami articulares arteria descendentis genus	Densitas postsynaptica
Apex radicis dentis	Arteria palatina descendens	Densitas presynaptica Stratum densocellulare

Ethical Committee

This study was carried out within the framework of ethical principles. Data for the study were obtained from Terminologia Anatomica (TA), other written anatomy sources and web archive records. Resources that are open and accessible to everyone were used. There was no use of any personal data as study data.

RESULTS

A total of 23 Latin terms related to dens were identified and analyzed among 8738 terms in TA (12). The analyzed terms are given in **Table 3**.

Table 3: List of terms reviewed

	Terminologia Anatomica (General Anatomy)						Netter's Atlas
	Latin term	Latin synonym	UK English term	American English term	English synonyms and eponyms	Notes	
	Termini generales		General terms	General terms			
1	Fovea dentis	-	Facet for dens	Facet for dens	-	-	-
2	Dens axis	-	Dens	Dens	Odontoid process		Dens, dens axis
3	Apex dentis	-	Apex	Apex	-	-	-
4	Facies articularis anterior dentis	-	Anterior articular facet	Anterior articular facet	-	-	Facies articularis anterior, facies articularis anterior, facies articularis dentis
5	Facies articularis posterior dentis	-	Posterior articular facet	Posterior articular facet	-	-	Facies articularis posterior dentis, facies articularis dentis
6	Sutura denticulata	-	Denticulate suture	Denticulate suture	Denticulated suture	-	-
7	Ligamentum apicis dentis	-	Apical ligament of dens	Apical ligament of dens	-	-	Lig. Apicis dentis
8	Ligamentum atlantodentale anterius	-	Anterior atlantodental ligament	Anterior atlantodental ligament	-	Anterior atlantodental ligament is present in over 80%, frequently connecting with the anterior Atlantooccipital ligament.	-
9	Linea pectinata	-	Pectinate line	Pectinate line	Dentate line	-	Linea pectinata (dentate)
10	Margo dentatus folioli	-	Scalloped edge of leaflet	Scalloped edge of leaflet	-	-	-
11	Rami gyri dentati	-	Branches to dentate gyrus	Branches to dentate gyrus	-	New term to be added.	-
12	Ligamentum denticulatum	-	Denticulate ligament	Denticulate ligament	-	-	Ligamentum denticulatum
13	Nucleus dentatus	Nucleus lateralis cerebelli	Dentate nucleus	Dentate nucleus	Lateral cerebellar nucleus	-	Nuclei cerebelli dentatus, nuc.dentatus
14	Hilum nuclei dentati		Hilum of dentate nucleus	Hilum of dentate nucleus	-	-	-
15	Limbus fasciae dentatae	Band of dentate gyrus	Band of dentate gyrus	-	-	Ibid eponym: Giacomini	-
16	Gyrus dentatus	-	Dentate gyrus	Dentate gyrus	-	-	-
17	Sulcus fimbriodentatus	-	Fimbriodentate sulcus	Fimbriodentate sulcus	-	-	-
18	Dentes subiculi	Gyri subsplenniales	Gyri of Andreas Retzius	Gyri of Andreas Retzius	Subsplenial gyri	See Footnote 100; eponym: A.Retzius.	-
19	Gyrus dentatus	-	Dentate gyrus	Dentate gyrus	-	-	Gyrus dentatus
20	Strata gyri dentati	-	Layers of dentate gyrus	Layers of dentate gyrus	-	-	-
21	Interneura gyri dentati	-	Interneurons of gyrus dentatus	Interneurons of gyrus dentatus	-	-	-
22	Dentes acustici	-	Acoustic teeth	Acoustic teeth	-	-	-
23	Epitheliocytus interdentalis	-	Interdental cell	Interdental cell	-	-	-

By scanning the anatomical literature, 23 anatomical terms not related to the tooth, including the word "dens" and its inflections, were identified. The structures in which they are found or in connection with which they are found are indicated under the headings.

1. Atlas and Axis

Main Structure: Dens axis

Related Structures: Ligamentum apicis dentis, Facies articularis anterior dentis, Facies articularis posterior dentis, Apex dentis, Fovea dentis, Collum dentis, Ligamentum atlantodentale anterius.

Dens axis

In TA it is called "Odontoid process" under the English synonym and eponym (12). The word dens is used in the Vocative form; that is, the word dens in the structure is directly addressed. It is a structure belonging to the axis and can be defined as the tooth-shaped projection of the axis that articulates with the atlas. For this reason, the word "dens" is used in the nomenclature. It is similar in shape to the dens caninus in the mandible. Ligamentum apicis dentis, which attaches to the dens axis, is located between the apex dentis and the clivus (for. magnum) (14).

Ligamentum apicis dentis

apex, apicis (m): hill

dentis: used in the genitive case and in the sense of dens

The word dens is used in the genitive form and can be translated as the ligament of the apex of the dens. Ligamentum apicis dentis (apical ligament of the odontoid process) is a developmental remnant derivable from the notochord. This ligament has no mechanical properties, arises from the tip of the dens axis and enters the midsagittal point of the anterior margin of the foramen occipitale magnum (15). This term may be confused with the periodontal ligament around the tooth root when approached as a translation, but essentially it has received its designation as the ligament attached to the dens axis. Again, in this respect, the ligament has no resemblance to a tooth.

Facies articularis anterior dentis and Facies articularis posterior dentis

facies, faciei (f): face, surface

articularis, to: of or pertaining to a joint, articular

anterior, -ius: more anterior, front

posterior, -ius: back, towards the back

dentis: used in the genitive case and in the sense of dens

They are the articular faces of the anterior and posterior parts of the dens axis that allow the rotational movement of the neck to be easily performed (16). As a term related to the tooth structure, facies mesialis dentis is translated as facies mesialis dentis: the mesal face of the tooth and it is noticeably similar in concept.

Apex dentis

apex, apicis (m): hill

dentis: used in the genitive case and in the sense of dens

This apex structure, which belongs to the dens axis, is pointed and anchors the lig. apicis dentis; below the apex the process widens slightly and presents a rough impression for the attachment of the alar ligaments on both sides; these ligaments connect the process to the occipital bone (17). In the TA it is called "apex" under the heading "Anatomia Generalis". Considering the terminological similarity between "apex cuspidis" and "apex radicis dentis" in the dentition, it is likely to cause confusion. However, apex cuspidis (cuspis, cuspidis (f): pointed tip, cuspid) means the cuspid apex and "apex radicis dentis" means the tooth root tip.

Fovea dentis

fovea, -ae (f): round pit

dentis: used in the genitive case and in the sense of dens

The oval articular surface on the posterior inner surface of the atlas is called the Fovea dentis (16). As it is understood from its definition, it is the depression where the dens axis sits as the articular surface. Alveolus dentalis: is used in the sense of tooth socket. Although there are similar expressions in meaning, this complexity is eliminated by using the alveolus structure.

Ligamentum atlantodentale anterius

ligamentum, -i (n): ligament, band, ligament

anterior, -ius: more anterior, front

It is a ligament that connects the anterior aspect of the dens axis to the posterior aspect of the anterior arch of the atlas. Due to the absence of a disc and the horizontal nature of the facet joints, the stability of the atlantoaxial joint depends primarily on the specialized ligaments and muscles of this region (18).

Collum dentis

collum, -i (n): neck

dentis: used in the genitive case and dens

The thin part of the dens axis where it joins the body is called the collum dentis (16). It is also used to mean the neck of the tooth. Considering that it is also used in dental anatomy because it belongs to the tooth structure, it can be seen that it creates terminological confusion. Although similar in expression, the anatomical structures they describe are different because they mean the place where the tooth crown narrows into a neck where it meets the root. As can be understood from the anatomical structures mentioned under these headings, the main structure is the dens axis and the fact that other anatomical structures contain the word dens is because they are related to this structure. At the same time, it is seen that some words cause confusion when translated.

2. Pia mater and Dura mater

Ligamentum denticulatum

ligamentum, -i (n): ligament, band, ligament

denticulatus, denticulata, denticulatum: fine-toothed, serrated/toothed, furnished with small teeth/protrusions

Ligamentum denticulatum is 21 pairs of tooth-like projections. They run laterally with the arachnoid and dura, between the exits of the roots of adjacent spinal nerves. Its highest process attaches just above the foramen magnum. The ligamentum denticulatum holds the spinal cord in place (18). This structure is probably so named because of its tooth-like indentation and protrusion.

3. Hippocampus

Main Structure: Gyrus dentatus

Related Structures: Limbus fasciae dentatae, Sulcus fimbriodentatus, Stratum moleculare gyri dentati, Sulcus fimbrio dentatus, Dentes subiculi, Interneura gyri dentati, Margo dentatus folioli.

Gyrus dentatus

gyrus, -i (m): fold, gyrus

dentatus, -a, -um: gear

The hippocampus is composed of the intricately folded layers of the dentate gyrus and the cornu ammonis (Latin Ammon horn), named after the Egyptian god Amun (Ammon to the Greeks), classically depicted with a ram's horn (19). Translated into Turkish, it means toothed folds; it is likely to have received this name because of its toothed and curved structure.

Limbus fasciae dentatae
limbus, -i (m): border, edge
facies, -ei (f): face, surface
dentatus, -a, -um: gear
Sulcus fimbriodentatus
sulcus, -e (m): groove
fimbria, -ae (f): fringe, fimbria
dentatus, -a, -um: gear
The fimbria hippocampi is the extension of the hippocampus that protrudes into the ventricle parallel to its long axis. The shape of the fimbria is highly variable but is separated medially by the sulcus fimbriodentalis from the serrated edge of the gyrus dentatus (19).

Dentes subiculi
dentes: simple plural form of dens
sub-: a preposition meaning below, under
subiculum: litter

Strata gyri dentati
stratum, -i (n): layer, stratum
gyrus, -i (m): fold, gyrus
dentatus, -a, -um: gear

Interneura gyri dentati
inter-: a prefix meaning between, between
neuron, -i (n): neuron, functional unit of the nervous system
gyrus, -i (m): fold, gyrus
dentatus, -a, -um: gear

Rami gyri dentati
gyrus, -i (m): fold, gyrus
ramus, -i (m): branch, arm
dentatus, -a, -um: gear

Margo dentatus foliolioli
margo, marginis (f): edge
dentatus, -a, -um: gear
foliatus, -a, -um: leafy
folium, -ii (n): leaf
"Scalloped edge of leaflet" in the UK English terms section of TA (12).

4. Cerebellum
Main Structure: Nucleus dentatus
Related Structures: Hilum nuclei dentati

Nucleus dentatus
nucleus, -i (m): nucleus, nucleus
dentatus, -a, -um: gear
The gray matter of the cerebellum consists of the cerebellar cortex and cerebellar nuclei. One of the four pairs of nuclei is the nucleus dentatus, which is neocerebellar (19). It is likely that the naming of this structure is due to the fact that its structure is indented and toothed.

Hilum nuclei dentati
hilum, hilus, -i (m): navel, hilus
nucleus, -i (m): nucleus, nucleus
dentate: gear

5. Rectum

Linea dentate
linea, -ae (f): line
dentate: gear
The border between the ampulla recti and canalis analis is separated by a thin saw-like line, called linea pectinata in TA and linea dentata or linea pectinata in Terminologia Histologica (16).

6. Sutura

Sutura denticulata
sutura -ae (f): stitch
denticulatus, denticulata,
denticulatum: fine-toothed, serrated/toothed, furnished with small teeth/protrusions (19).
Sutura denticulata means toothed suture and is so named because of its shape. An example of this type of suture is the sutura lambdoidea (19).

7. Membrana Tectoria

Dentes acustici
dentes: simple plural form of dens
acusticus, -a, -um : relating to hearing, acoustic

Epitheliocytus interdentalis
epithelium, -i (n): epithelium
cysticus, -a, -um: of or pertaining to cystis, cystic
inter: a prefix meaning between, between
dentalis, to: of or pertaining to the tooth, dental

DISCUSSION

Although the word dens is a word related to teeth or dental structures, 23 "dens" terms were found among anatomy terms that were not related to teeth or dental structures. When the terms with the word dens are examined, it is seen that the word dens is mostly inspired by the shape of the anatomical structure. In order for scientific communication to be very robust, it is important that a term express the same thing for everyone dealing with that science. Knowing the origin, structural features, meanings and usage characteristics of the terms belonging to the branch of science contributes to learning that science more easily (13).

Anatomy terminology contains the oldest and most basic terms in medical branches. Most of the terms of other branches are derived based

on these terms. In this respect, it serves as a basic resource for all health-related disciplines (5). The correct use of anatomical terminology, which is of such great importance for the development of medical sciences, is of great importance for both students and practicing physicians. Learning, remembering and understanding specialized anatomical terms is one of the biggest challenges faced by students. Lack of anatomical knowledge guiding physicians in surgical or invasive interventions can cause difficulties in defining and expressing applications, and the use of incorrect or different terminology can affect patient safety and lead to serious consequences in communication (20).

For this reason, studies have been conducted to examine the terminology of anatomy according to their own languages in order to better understand and facilitate learning. In Turkey, Esersoy et al., examined the terms related to the locomotor system in TA and the adjectives in these terms in terms of origin, degree and form. They also explained the Turkish equivalents of these terms (21). In the present study, 23 "dens" words used independently of tooth structure among anatomy terms were analyzed and grouped together with their Turkish equivalents. It is seen that the word "dens" is mostly used in terms with adjective structure. This will make it easier to understand the word "dens" used in anatomy terminology without causing confusion.

Our anatomical terminology is generally rooted in Classical Latin and Greek. This makes it difficult for students to learn anatomical terms in many parts of the world. Some nations have made efforts to make medical terminology easier to learn and better understood. In the study conducted by Shikano and Yamashita, the names and adjectives of the anatomical structures of the head and neck were examined in terms of Japanese (22). In the present study, the anatomical structures containing the word "dens" in TA and other anatomy sources were examined and their meanings in Turkish were examined. In this way, anatomical structures containing the word dens will be more easily understood by students and researchers.

Anatomical terms can refer to a place (suprahyoidei), a function (adduction), a shape (deltoid), another living thing (vermis), an object (calyx), a letter (sigmoid), a mythological character (Atlas, Achilles), plant or animal. In a study by Unur et al., after examining all terms in the TA published in 1998 and prepared by the Federative Committee for Anatomical Terminology (FACT), those derived from plant names were identified and their Turkish equivalents were found from 13 dictionaries and tabulated (6). In the study, 23 words containing the word dens but not related to the anatomy of the tooth were identified. While naming these anatomical structures, it is seen that the word dens is used inspired by the shape of these structures.

In the study, 23 dens words that were not related to teeth were identified among anatomical terms. It was observed that 15 of the identified dens words were used as adjectives. In this study, information is given about the conjugation of the word "dens" and the terms used with it, and we think that the terms related to the word dens will be understood more clearly by educators and students. We also believe that this study will guide studies on terminology in Turkey.

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