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RESEARCH

Twisted neck: insights into etiology and clinical outcomes of pediatric torticollis

Eğri boyun: çocukluk çağı tortikollisinin etyolojisi ve klinik sonuçlarına ilişkin bulgular

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Abstract

Purpose: This study aimed to evaluate the demographic and clinical characteristics of pediatric torticollis, to compare congenital and acquired cases, and to identify predictors of hospitalization in a tertiary care setting.
Materials and Methods: We retrospectively analyzed 370 pediatric patients diagnosed with torticollis between 2014 and 2024 in both emergency and outpatient clinics of a tertiary pediatric hospital. Data included demographics, presenting complaints, physical examination findings, imaging studies, etiology, treatment, and hospitalization outcomes.
Results: The median age at presentation was 76.95 [IQR:33.37-128.46] months, with a slight male predominance. Acquired etiologies were the most common (93.2%), particularly trauma (78.0%) and infectious/inflammatory causes (17.7%), while congenital cases accounted for 6.8%. Infectious/inflammatory causes, especially retropharyngeal abscess and cervical lymphadenitis, represented the majority of admissions (68.3%). Among presenting complaints, fever and a history of trauma were significantly associated with hospitalization, while on physical examination, tenderness and restricted range of motion were significant predictors.
Conclusion: This study highlights that acquired causes, particularly trauma and infectious etiologies, predominate in pediatric torticollis. Although most cases are benign, hospitalization is often warranted when systemic or red-flag symptoms are present. Careful clinical evaluation supported by appropriate imaging remains essential for early recognition and optimal management.

Keywords: Torticollis, congenital muscular torticollis, acquired torticollis

Öz

Amaç: Bu çalışmada, pediatrik tortikollisin demografik ve klinik özelliklerinin değerlendirilmesi, konjenital ve edinsel olguların karşılaştırılması ve üçüncü basamak bir merkezde hastaneye yatışı öngören faktörlerin belirlenmesi amaçlanmıştır.
Gereç ve Yöntem: 2014–2024 yılları arasında bir çocuk hastanesinin acil servis ve pediatri polikliniklerine tortikollis tanısı ile başvuran 370 çocuk hastanın dosyası retrospektif olarak incelendi. Veriler; demografik özellikler, başvuru şikâyetleri, fizik muayene bulguları, görüntüleme yöntemleri, etiyoloji, tedavi ve yatış sonuçlarını içermekteydi.
Bulgular: Hastaların ortanca yaşı 76.95 [IQR:33.37-128.46] ay olup, erkek cinsiyet hafifçe baskındı. En sık edinsel etiyolojiler (%93,2) saptanmış; bunlar arasında travma (%78,0) ve enfeksiyöz/inflamatuvar nedenler (%17,7) öne çıkmıştır. Konjenital olgular ise %6,8 oranında görülmüştür. Yatışların çoğu (%68,3) enfeksiyöz/inflamatuvar nedenlere, özellikle retrofaringeal apse ve servikal lenfadenite bağlıydı. Başvuru şikâyetleri arasında ateş ve travma öyküsü hastaneye yatış ile anlamlı ilişkili bulunurken; fizik muayenede hassasiyet ve hareket kısıtlılığı önemli prediktörler olarak öne çıktı.
Sonuç: Bu çalışma, pediatrik tortikolliste edinsel nedenlerin, özellikle travma ve enfeksiyöz etiyolojilerin baskın olduğunu ortaya koymaktadır. Olguların çoğu benign olmakla birlikte, sistemik bulguların veya uyarıcı semptomların varlığında hastaneye yatış gerekebilmektedir. Erken tanı ve tedavi için uygun görüntüleme yöntemleriyle desteklenen dikkatli klinik değerlendirme kritik öneme sahiptir.

Anahtar kelimeler: Tortikollis, konjenital musküler tortikollis, edinsel tortikollis

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INTRODUCTION

Torticollis is a postural deformity characterized by lateral tilting of the head and rotation of the chin to the opposite side, resulting from spasm, shortening, or imbalance of the neck muscles. While it may present as a sign or symptom of various underlying disorders, its etiological causes vary across infancy and childhood[1-3].

Etiologically, torticollis is broadly classified into two main categories: congenital (present at birth) and acquired (developed postnatally). In neonates and infants, congenital torticollis is typically associated with craniovertebral anomalies or muscular pathologies, with an incidence ranging from 0.3% to 1.9%[4,5]. In older children and adolescents, acquired torticollis is more often secondary to trauma, infections, neurological disorders, ocular diseases, adverse drug reactions, or neoplastic conditions[3,6,7]. Acquired torticollis in children is a rare condition in general pediatric outpatient clinics, and because it has multiple heterogeneous causes, its incidence has not been defined[8]. It is reported to be detected in 2 or 3 of every 1,000 patients presenting to the pediatric emergency department (PED)[9].

Several studies have investigated the causes of pediatric torticollis, however, marked discrepancies exist in the distribution of reported etiologies. These inconsistencies are largely due to differences in the populations studied, clinical settings (e.g., emergency departments versus outpatient clinics), methodological approaches, diagnostic strategies and reporting practices. The diagnostic evaluation of torticollis also varies depending on the suspected etiology. X-ray imaging may be used in selected trauma-related cases, while ultrasonography being non-invasive and free of ionizing radiation is preferred in congenital muscular torticollis. Computed tomography (CT) and magnetic resonance imaging (MRI) are reserved for evaluating trauma, deep neck infections, or neurological causes, according to the clinical suspicion[6,10].

Despite the available literature, current evidence on pediatric torticollis remains fragmented, as most studies focus on isolated subgroups and lack a comprehensive comparison of congenital and acquired etiologies across diverse clinical settings. To address this gap, the present study evaluates a broad pediatric cohort to characterize the demographic and clinical features of torticollis and to compare congenital and acquired cases with respect to clinical presentation, physical examination findings, imaging patterns, and management approaches. By further assessing clinical factors associated with hospitalization, this study aims to provide clinically meaningful insights that may support early recognition and guide decision-making in pediatric practice. Based on this rationale, we hypothesized that congenital and acquired torticollis differ significantly in their clinical profiles and imaging utilization, and that specific clinical variables may be associated with the need for hospitalization.

MATERIALS AND METHODS

Study design

This study was designed as a retrospective, descriptive, and cross-sectional observational study. It was conducted in the Department of Pediatrics, Ankara University, and included patients who presented to the general pediatric outpatient clinics or the pediatric emergency department between January 1, 2014, and January 31, 2024.The study protocol was approved by the Clinical Research Ethics Committee of Ankara University School of Medicine (Approval No: İ06-536-25).

All clinical evaluations and diagnostic procedures in the general pediatrics outpatient clinics and the pediatric emergency department were performed by pediatricians and pediatric emergency specialists in accordance with institutional clinical care standards. Imaging studies (US, CT, and MRI) were performed and interpreted by pediatric radiologists within the Department of Pediatric Radiology, following standardized departmental protocols.

The institution uses an integrated Hospital Information Management System (HIMS), which ensures standardized electronic documentation, secure data storage, and high reliability of archived medical records. These institutional practices support the accuracy, completeness, and consistency of the data used in this retrospective study.

Sample

The study population comprised all patients aged 0 to 18 years who were diagnosed with torticollis during the study period. Patients were included if they had a confirmed diagnosis of torticollis based on ICD-10 coding or documented physical examination findings

and complete clinical and diagnostic data. Patients were excluded if they were older than 18 years, had incomplete medical records, or had suspected but unconfirmed torticollis. As this study was conducted retrospectively, no sample size calculation was performed, and all patients who met the diagnostic criteria within the study period were included; therefore, a power analysis was not applicable. Due to the retrospective design and the structure of the hospital information system, the total number of patients screened prior to applying the inclusion criteria could not be retrieved.

Data collection procedures

During data collection, patients were primarily identified using relevant ICD-10 diagnostic codes, including M43.6 (torticollis), Q68.0 (congenital muscular torticollis), G24.3 (spasmodic torticollis), M43.3 (atlantoaxial subluxation), S13.1 (cervical muscle and ligament injuries), L02.1/J39.0 (retropharyngeal infections), H49 (ocular nerve palsies), and P94.2 (postural tone disorders of the newborn).

In addition to these coded diagnoses, we also screened all patients for whom X-ray, ultrasound (US), cervical/neck computed tomography (CT), and magnetic resonance imaging (MRI) had been ordered by pediatric emergency or outpatient physicians and performed by the pediatric radiology unit. Patient records from this imaging-based screening were reviewed, and those with documented torticollis findings on physical examination were also included. This methodology ensured inclusion of clinically confirmed torticollis cases that may have lacked proper diagnostic coding in the electronic system.

Variables and definitions

A standardized data collection form was used for each patient. The etiology of torticollis was categorized into two main groups: congenital and acquired. Congenital causes included positional, muscular, and craniovertebral anomalies (such as Klippel–Feil syndrome), whereas acquired causes were classified as traumatic, inflammatory/infectious, neurological (including drug-induced dystonia), neoplastic, and episodic[11]. Data collected comprised demographic characteristics (age, sex), presenting complaints, physical examination findings, imaging modalities used (US, CT, or MRI), etiology of torticollis, treatment modalities (conservative, surgical, or physical therapy), and hospitalization.

Statistical analysis

Descriptive statistics were used to analyze the data. Continuous variables were presented as mean ± standard deviation (SD), median (minimum–maximum), and interquartile range (IQR), while categorical variables were expressed as counts and percentages (%). Comparisons between congenital and acquired torticollis groups were performed using the chi-square test or Fisher's exact test for categorical variables. For continuous variables, the independent samples t-test was used for normally distributed data, whereas the Mann–Whitney U test was applied for non-normally distributed data. A p-value of <0.05 was considered statistically significant. All statistical analyses were performed using SPSS software (version 30, IBM Corp., Armonk, NY, USA).

RESULTS

A total of 370 pediatric patients diagnosed with torticollis were included in the study. The median age at presentation was 76.95 [IQR: 33.37–128.46] months. There were 188 (50.8%) males and 182 (49.2%) females (Table 1). The most common presenting symptom was neck pain (67.0%), followed by limited range of motion (50.5%), tilting of the head (10.0%), and fever (9.2%). A history of trauma was present in 19.5% of cases. On physical examination, restricted motion was noted in 73.5%, tenderness in 51.9%, and neck swelling in 18.6%. X-rays were the most frequently performed imaging method (76.2%), followed by US (22.7%), CT (13.8%), and MRI (2.2%). Pharmacological treatment was administered to 80.1% of cases, while 19.5% received exercise-based therapy. Surgery was performed in 1.7% of cases, and a cervical collar was used in 1.2%. (Table 1).

Congenital torticollis was observed in 6.8% (n=25) of cases, whereas acquired torticollis was present in 93.2% (n=345). Of the congenital cases, positional torticollis was the most common (56.0%), followed by muscular torticollis (36.4%) and Klippel-Feil syndrome (12.0%) (Table 2, Figure 1).

In the acquired group, traumatic etiologies were the most common (78.0%), particularly muscular trauma (86.6%). Inflammatory/infectious causes were identified in 17.7% of cases, including cervical lymphadenitis (54.1%) and retropharyngeal abscess (39.3%) (Figure 2). Neurological causes, including dystonic drug reactions and cerebral palsy (3.5%),

were uncommon. Neoplastic causes were extremely rare, with only one case of neuroblastoma and one case of a cervical cord tumor identified (0.6%) (Figure 3).

Table 1. Patient characteristics

Variables	**Patients (n=370)**	
Age (months), median [25th-75th percentile] Min-Max	76.95 [33.37-128.46] 0.37-226.07	
Gender, n (%)		
Male	188	(50.8)
Female	182	(49.2)
Presenting complaints, n (%)		
Neck pain	248	(67.0)
Limited range of motion	187	(50.5)
History of trauma	72	(19.5)
Neck swelling	54	(14.6)
Tilting head to one side	37	(10.0)
Fever	34	(9.2)
Headache	10	(2.7)
Physical examination findings, n (%)		
Restricted movement	272	(73.5)
Tenderness	192	(51.9)
Swelling	69	(18.6)
Firmness compared to contralateral side	39	(10.5)
Imaging Studies Performed, n (%)	358	(96.8)
X-ray	282	(76.2)
Ultrasonography	84	(22.7)
Computed tomography	51	(13.8)
Magnetic resonance imaging	8	(2.2)
Treatment, n (%)	241	(65.1)
Pharmacologic	193	(80.1)
Physiotherapy	47	(19.5)
Cervical collar	4	(1.7)
Surgery	3	(1.2)
Hospitalization, n (%)	41	(11.1)
All values are presented as n (%)		

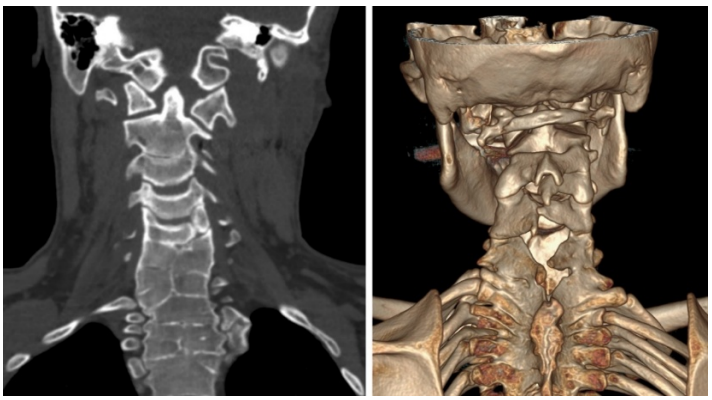

Figure 1. Klippel-Feil syndrome; coronal-reformatted cervical CT and 3D VR images show multiple fusion and segmentation anomalies of cervical and upper thoracic vertebrae.

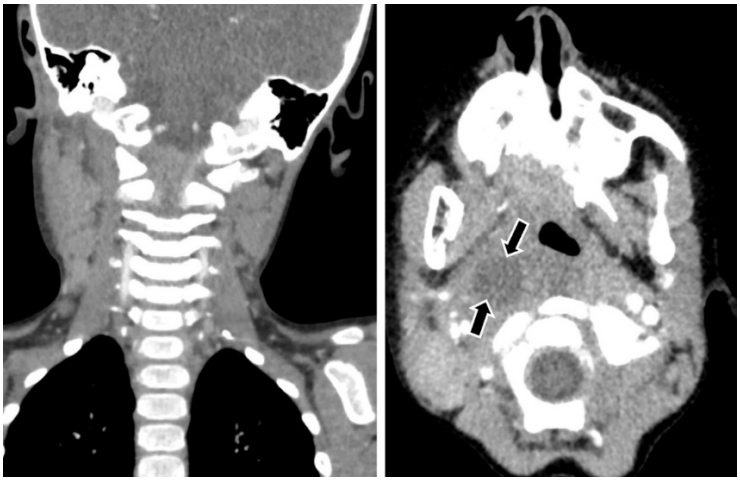

Figure 2. Retropharyngeal abscess and associated torticollis; contrast-enhanced neck CT demonstrates a right-sided retropharyngeal abscess (arrows).

Table 2. Classification of torticollis

Variables	**Patients (n=370)**		**Age-months median**
Congenital, n (%) [25th-75th percentile] Min-Max	25	(6.8)	3.2 [1.76-8.56] 0.70-196.57
Positional	14	(56.0)	
Muscular	8	(32.0)	
Craniovertebral anomalies Klippel Feil syndrome	3	(12.0)	
Acquired, n (%) [25th-75th percentile] Min-Max	345	(93.2)	83.03 [42.15-130.68] 0.37-226.07
Traumatic, n (%) [25th-75th percentile] Min-Max	269	(78.0)	83.96 [40.15-140.70] 0.37-212.93
Muscular trauma	233	(86.6)	
Fibromatosis coli	33	(12.3)	
Atlantoaxial subluxation	2	(0.7)	
Rotatory subluxation	1	(0.4)	
Inflammatory/infectious, n (%) [25th-75th percentile] Min-Max	61	(17.7)	76.76 [54.30-110.45] 1.63-164.20
Cervical lymphadenitis	33	(54.1)	
Retropharyngeal abscess	24	(39.3)	
Grisel's syndrome	2	(3.3)	
Juvenile idiopathic arthritis	1	(1.6)	
Infected branchial cleft cyst	1	(1.6)	
Neurological/neurogenic, n (%) [25th-75th percentile] Min-Max	12	(3.5)	102.25 [42.68-200.48] 5.63-226.07
Dystonic drug reaction	10	(83.3)	
Cerebral palsy	2	(16.7)	
Neoplastic, n (%) Min-Max	2	(0.6)	61.48 8.10-114.87
Episodic, n (%)	1	(0.3)	7.03

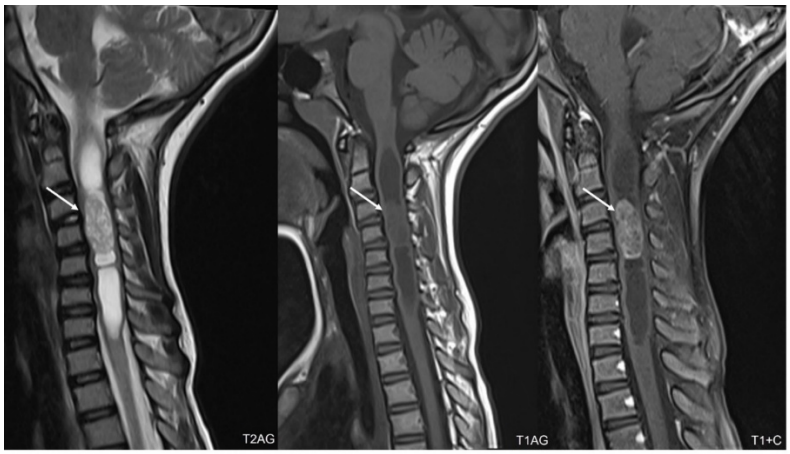

Figure 3. Cervical ependymoma; contrast-enhanced cervical MRI demonstrates an enhancing solid lesion and peritumoral cystic components at the cervical spinal cord (arrows).

Table 3. Comparison between congenital and acquired torticollis

Variables	**Congenital (n=25)**		**Acquired (n=345)**		**p**
Age at presentation (months) Mean Median	 13.68±38.89 3.20		 87.96±59.09 83.03		 <0.001 0.308
Gender, n (%)					
Male	14	(56.0)	174	(50.4)	0.591
Female	11	(44.0)	171	(49.6)	
Presenting complaints, n (%)					
Tilting head to one side	17	(68.0)	20	(5.8)	<0.001*
Limited range of motion	5	(20.0)	182	(52.8)	0.002*
Neck swelling	5	(20.0)	49	(14.2)	0.387*
Neck pain	1	(4.0)	247	(71.6)	<0.001†
History of trauma	1	(4.0)	71	(20.6)	0.062 †
Fever	0	(0)	34	(9.9)	N/A
Headache	0	(0)	10	(2.9)	N/A
Physical examination findings, n (%)					
Restricted movement	21	(84.0)	251	(72.8)	0.218*
Swelling	4	(16.0)	65	(18.8)	1.000 †
Firmness compared to contralateral side	3	(12.0)	36	(10.4)	0.737 †
Tenderness	0	(0)	192	(55.7)	N/A
Imaging Studies Performed, n (%)					
Ultrasonography	17	(68.0)	67	(19.4)	<0.001*
X-ray	5	(20.0)	277	(80.3)	<0.001*
Computed tomography	3	(12.0)	48	(13.9)	1.000 †
Magnetic resonance imaging	1	(4.0)	7	(2.0)	0.432†
Treatment, n (%)					
Physiotherapy	11	(44.0)	77.1	(10.7)	<0.001*
Pharmacologic	0	(0)	193	(55.9)	N/A
Cervical collar	0	(0)	4	(15.4)	N/A
Surgery	0	(0)	3	(3.0)	N/A
Hospitalization, n (%)	0	(0)	41	(11.1)	N/A

* Pearson Chi-square Test † Fisher's Exact Test, N/A: non-applicable
All values are presented as n (%)

Table 4. Characteristics of hospitalized patients

Variables	**Hospitalized patients n=41**	
Age (months), Mean Median [25th-75th percentile] Min-Max	 83.38±51.23 73.5 [49.1-114.8] 8.1-226.07	
Length of hospital stay (days), Median [25th-75th percentile] Min-Max	 8.0 [1.5-10.0] 1-32	
Gender, n (%)		
Female	29	(70.7)
Male	12	(29.3)
Presenting complaints, n (%)		
Neck pain	26	(63.4)
Limited range of motion	24	(58.5)
Fever	20	(48.8)
Neck swelling	6	(14.6)
History of trauma	2	(4.9)
Headache	1	(2.4)
Physical examination findings, n (%)		
Restricted movement	38	(92.7)
Tenderness	30	(73.8)
Swelling	10	(24.4)
Acquired causes, n (%)	41	(100)
Inflammatory/infectious	28	(68.3)
Retropharyngeal abscess	24	(85.7)
Grisel's syndrome	2	(7.1)
Cervical lymphadenitis	1	(3.6)
Infected branchial cleft cyst	1	(3.6)
Neurological/neurogenic	9	(22.0)
Dystonic drug reaction	9	(100.0)
Traumatic	3	(7.3)
Atlantoaxial subluxation	2	(66.7)
Rotatory subluxation	1	(33.3)
Neoplastic	1	(2.4)
Neuroblastoma	1	(100.0)
Imaging Studies Performed, n (%)	37	(90.2)
Computed tomography	31	(75.6)
X-ray	20	(48.8)
Ultrasonography	13	(31.7)
Magnetic resonance imaging	5	(12.2)
Departments of Admission, n (%)		
Pediatric Infectious Diseases	23	(56.1)
Pediatric Emergency	10	(24.4)
Otorhinolaryngology	2	(4.9)
Pediatric Intensive Care Unit	2	(4.9)
Neurosurgery	2	(4.9)
Pediatric Neurology	1	(2.4)
Pediatric Oncology	1	(2.4)

All values are presented as n (%)

When comparing congenital and acquired torticollis, the mean age at presentation was significantly lower in the congenital group (3.85 ± 2.8 months) compared to the acquired group (87.46 ± 58.5 months; $p < 0.001$). Tilting the head to one side was significantly more frequent in the congenital group (68.0% vs. 5.8%, $p < 0.001$), while neck pain, limited range of motion, trauma history and fever were more common in the acquired group. The use of US was significantly higher in congenital torticollis ($p < 0.001$), while radiography was more frequently performed in acquired cases ($p < 0.001$). Pharmacological treatment and hospitalization were more frequent in acquired torticollis, whereas physiotherapy was predominantly used in congenital cases ($p < 0.001$) (Table 3).

Hospitalization was required in 11.1% (n=41) of cases. The mean age of hospitalized patients was 83.38±51.23 months, and 70.7% were female (Table 4). The most common presenting symptoms among hospitalized patients were neck pain (63.4%), limited range of motion (58.5%), and fever (48.8%). Among the presenting symptoms, fever ($p < 0.001$) and a history of trauma ($p = 0.012$) were significantly associated with hospitalization. Physical examination revealed that tenderness ($p = 0.012$), firmness compared to the contralateral side ($p = 0.008$) and restricted movement ($p = 0.012$) were significant predictors of hospitalization. All cases admitted to hospital (100%) had acquired torticollis. The most common causes were inflammatory/infectious (68.3%), followed by neurological (22.0%) and traumatic (7.7%) causes. The median duration of hospital stay was eight days (range: 1–32) and the majority of admissions were to the departments of pediatric infectious diseases (56.1%) and pediatric emergency care (24.4%).

DISCUSSION

While previous research has largely focused on congenital muscular torticollis in infancy or on selected acquired causes such as trauma or infection, systematic comparisons of congenital and acquired cases across the pediatric age spectrum remain limited. By analyzing a large cohort of children aged 0–18 years over a 10-year period, our study provides a broad perspective on demographic and clinical differences, diagnostic approaches, and management strategies, thereby filling an important gap in the current literature.

The present study demonstrated a median age at presentation of 76.95 months, with a slight male predominance. This finding is consistent with previous reports of a slight male predominance in cases of both congenital and acquired torticollis[8,12]. The relatively higher mean age observed in our patients may reflect the predominance of acquired etiologies. The higher frequency of acquired causes compared to congenital ones may be explained by the characteristics of our setting as a tertiary PED, where emergency visits considerably outweigh routine outpatient consultations. Pharisa et al.[13] identified trauma (62%) and infections (19.6%) as the predominant causes among emergency department presentations, whereas Raucci et al.[8] reported postural (43.1%), traumatic (29.5%), and inflammatory (19.1%) etiologies in a similar acute care cohort. In contrast, Yılmaz et al.[14], in a clinic-based study, found congenital torticollis (91.4%) to be the most frequent etiology. Moreover, the recognition of rare causes is strongly influenced by the use of diagnostic coding and the availability of advanced imaging modalities. These factors highlight the importance of interpreting the etiological spectrum of pediatric torticollis within the context of study design and clinical environment. In our study, the most common form of presentation was acquired, with trauma being the most common cause. Similarly, Pharisa et al.[7] identified the most common acquired causes in paediatric patients presenting to the emergency department, reporting trauma in 61.9% of cases, which is consistent with our findings. By contrast, Starc et al.[12], reported that postural torticollis was the most common etiology in their emergency department cohort. At the same time, Minghelli and Vitorino[11] emphasized that congenital muscular torticollis is most prevalent in early infancy, with the etiological spectrum varying across age groups. From Türkiye, Oğuz and Açoğlu reported that infections and postural factors were the most frequent causes of acquired cases. These discrepancies highlight the key role of study design, clinical setting and population characteristics in determining the reported etiological distribution. The notably high prevalence of trauma in our series is consistent with rates reported in some recent studies. This finding may reflect the epidemiological characteristics of our region, where childhood injuries account for a significant proportion of PED admissions, as well as our classification of patients with abnormal neck movements under traumatic etiologies.

Traumatic causes should always be considered when evaluating torticollis in children, as failing to identify them can lead to serious neurological complications. Rotatory subluxation of the atlantoaxial joint is the most common traumatic lesion associated with such complications[15,16]. In our study, atlantoaxial subluxation was detected in two patients and rotatory subluxation in one. Previous studies have also emphasized that atlantoaxial subluxation is a rare consequence of trauma[8,13].

Cervical lymphadenitis can lead to inflammatory spasm of the sternocleidomastoid muscle, resulting in torticollis. The diagnosis is usually straightforward when lymph nodes are enlarged and tender. However, it may be more challenging in cases of mild adenitis. The rarity of these conditions, the wide range of symptoms and the difficulty of examining the oropharynx in children further complicate the diagnostic process, and misdiagnosis is therefore possible. Other infectious or inflammatory conditions of the oropharynx and neck region can also cause torticollis through similar pathophysiological mechanisms[15,17,18]. In our study, cervical tenderness in 51.9% of patients, neck swelling was observed in 18.6%, and fever in 9.2%. These findings were primarily associated with infectious etiologies. Although these causes are less frequent than trauma, the results highlight their clinical importance of infectious causes, particularly because they can easily be confused with other benign conditions in the early stages. Similarly, previous studies have emphasized how difficult it is to diagnose mild lymphadenitis or oropharyngeal infections as the cause of torticollis, as opposed to more common causes[8,12]. Therefore, the timely recognition and appropriate management of infectious torticollis require a careful evaluation of the oropharynx and neck region. Particular attention should be paid to the size and tenderness of the lymph nodes, as well as any associated systemic symptoms. Radiological imaging should be considered when the clinical diagnosis remains uncertain[18].

The underlying causes of acquired torticollis are diverse. They may also include less common conditions such as neurological disorders (e.g., dystonia) and central nervous system tumors[8,17]. Torticollis associated with central nervous system tumors is usually caused by stretching of the dura or compression of the accessory nerves, resulting in pain and an abnormal head posture. A delayed diagnosis may result in tumor progression, neurological deterioration and even death. This highlights the importance of considering these rare but serious causes when making a differential diagnosis of pediatric torticollis[18,19]. Although neurological and neoplastic causes were identified at a comparatively low rate in our study (3.5% and 0.6%, respectively), they are nevertheless significant in the differential diagnosis.

A comprehensive examination of the head, neck, eyes, and nervous system is crucial in children with torticollis. Particular attention should be given to respiratory tract infections, cervical masses, sternocleidomastoid muscle abnormalities, vertebral tenderness and neurological deficits, since torticollis is a symptom rather than a disease and may occasionally be the first indication of an underlying serious condition[15,20]. In our study, the most prevalent presenting complaints were neck pain (67.0%) and limited range of motion (50.5%), followed by a history of trauma (19.5%) and neck swelling (14.6%). Neck pain, fever, a history of trauma and headaches were particularly prevalent in cases of acquired torticollis, suggesting that these findings are key clinical indicators of the condition in children. Consistently, previous studies have also highlighted pain, limitation of neck movement, and trauma as the most typical initial findings in acquired pediatric torticollis[8,13]. On physical examination, the most common findings in our study were restricted movement (73.5%), tenderness (51.9%), and swelling (18.6%). Similarly, Blankstein et al.[21] reported restricted movement (46%) and tenderness (38%) as the predominant features in their series, supporting the consistency of these signs in different populations. The higher prevalence of restricted movement and tenderness in our study may be explained by the predominance of acquired causes such as trauma and infections.

Radiological imaging is necessary if symptoms persist, atypical findings are present, or cervical spine or central nervous system pathology is suspected[15,18]. US is often preferred in congenital muscular torticollis because it is non-invasive and free of ionizing radiation. X-ray generally used as an initial screening tool, particularly in trauma-related cases, although its role is limited in conditions such as dystonia or deep neck infections. CT especially contrast-enhanced CT, is valuable for detecting atlantoaxial or rotatory dislocation and deep neck infections. MRI is reserved for patients with

abnormal screening results or persistent symptoms, to provide further evaluation of soft tissue and intracranial structures[22,23]. In our study, radiological investigations were widely used, with X-ray performed in 76.2% of patients, US in 22.7%, CT in 13.8%, and MRI in 2.2%. The high utilization of first-line modalities such as X-ray and ultrasound underscores their importance in clinical practice. In contrast, the selective use of CT and MRI reflects a targeted approach that is consistent with current literature recommendations.

Acute acquired non-traumatic torticollis is usually benign, but it may occasionally indicate a serious underlying condition that requires hospitalization. In our study, 41 patients (11.1%) were hospitalized, with a median hospital stay of eight days. The majority of admissions were due to infectious and inflammatory etiologies (66.7%), most commonly retropharyngeal abscess and cervical lymphadenitis. These findings are consistent with previous studies reporting that infectious causes are the predominant driver of hospitalization in pediatric torticollis[24]. In our study, pain, limited range of motion, and fever were the most common presenting complaints among hospitalized patients, highlighting the importance of systemic or red flag symptoms in determining the need for admission. Notably, fever and a history of trauma were significantly associated with hospitalization, while on physical examination, tenderness and restricted range of motion emerged as significant predictors of hospitalization. These findings partially overlap with those reported by Starc et al.[12], who identified age younger than 5 years, fever, sore throat, and headache as red flags for hospitalization in pediatric torticollis. While both studies emphasize the importance of fever as a key risk factor, our results also highlight the importance of trauma history and musculoskeletal findings, such as tenderness and restricted movement, in predicting hospitalization. This may be due to the fact that most cases in our cohort were trauma-related and acquired. This discrepancy may be explained by differences in study populations and clinical settings, with our series representing a tertiary pediatric emergency department where acute trauma-related presentations are more common. While hospitalization durations in the literature generally median range four days[8,21,24]. The longer median stay observed in our study may be due to the higher proportion of infectious causes and the inclusion of patients at risk of complications. Taken together, these results suggest that, while pediatric torticollis is usually benign, hospitalization should be considered if an infectious cause or other serious condition is suspected.

The main limitation of our study is its retrospective design. Patients without a documented diagnosis of torticollis in the hospital database or without radiological evaluation may have been excluded. Because of the retrospective design of the study, detailed information on the specific medications and administration methods could not be consistently obtained from patient records, particularly for outpatient cases. In addition, being a single-center study limits the generalizability of our findings. As most cases were admitted through a tertiary pediatric emergency department rather than general pediatric outpatient clinics, acquired and acute etiologies were more prevalent in our study. Finally, the relatively small number of patients with rare etiologies restricted our ability to draw conclusions for these subgroups.

Our study encompassed both emergency and outpatient cases and provided a multidimensional comparison of congenital and acquired forms. This comprehensive approach offers valuable insights that may enhance diagnostic evaluations and assist clinicians in the effective management of pediatric torticollis.

In conclusion, this extensive study demonstrates that acquired causes, particularly trauma and infectious/inflammatory etiologies, are the main causes of torticollis in children presenting at a tertiary center. Hospitalization was required for patients with systemic or red flag symptoms, such as fever, severe pain, or a restricted range of motion. For pediatricians, this highlights the importance of recognizing that torticollis may be an early sign of a more serious underlying condition, rather than just a benign musculoskeletal problem. A careful clinical assessment, supported by imaging where necessary, is crucial for ensuring a timely diagnosis and optimal management.

Future research should prioritize prospective, multicenter studies to refine risk stratification and develop validated clinical prediction tools. Establishing standardized diagnostic and management pathways may help reduce unnecessary imaging and improve early recognition of high-risk patients. Moreover, long-term outcome studies across distinct etiological subgroups are needed to guide follow-up strategies and targeted rehabilitation approaches.

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