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Frenal tears: accidental or non-accidental?

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INTRODUCTION

Child abuse is "*any act of commission or omission by a parent/guardian which could endanger or impair the child's physical/emotional well-being or that is judged by a mixture of community values and professionals to be inappropriate*".[1] This includes physical abuse (i.e. non-accidental injury [NAI]), emotional abuse, sexual abuse and/or neglect. About 60% of cases reported in Singapore involve physical abuse (NAI), with an increasing trend over recent years.[2] With the COVID-19 pandemic,[3] all agencies and healthcare professionals should increase vigilance as at-risk children become more vulnerable.

The international literature reported that over half of physical child abuse cases are associated with head, neck and orofacial trauma.[4-7] Similarly, a Singapore study of almost 2,000 abused children found that 50.8% of NAI cases had head and neck injuries.[2] Unfortunately, it was unclear from the study if any intra-oral injuries were noted. Another study found that in 200 abused infants, 27.5% had a previous history of 'suspicious' injuries that were not acted upon, with 11% of these being intra-oral injuries including frenal or tongue injuries.[8]

Medical professionals, who are often the first contact with an injured child, are well-positioned to make a referral to a dental professional for oral injuries. Dentists should recognise the significance of oral injuries in the context of other injuries and histories. Among intra-oral injuries, the frenal injury is probably the most accessible to a non-dental professional. Yet, the association of frenal injuries with physical abuse and NAI has been controversial. The paper summarises the literature concerning frenal injuries associated with accidental and non-accidental causes.

STUDIES REPORTING NAI-RELATED FRENAL TEARS

Needleman in 1986 theorised that a torn frenum in an ambulatory child (aged > 2 years) could be due to force-feeding or a deliberate insult to a screaming child by a frustrated parent. Therefore, this sign could be pathognomonic of NAI.[7] However, he admitted that this claim was based solely on the unusually high frequency of abusive torn frena (45%) reported by Cameron et al in 1966.[9] Such results are inconsistent with data from other studies.

In 2009, Gabriel noted from autopsy results that there was a torn frenum in one of the nine children that succumbed to NAI.[10] The torn frenum did not occur in isolation as the child also suffered concomitant injuries. It was also reported by Thackeray in 2007 that three infants returned with abusive injuries after previous discharge following assessment of an isolated torn frenum at a hospital.[11] The consequence of inadequate history taking for the initial mechanism of injury could result in subsequent harm if it was wrongly dismissed as accidental. Between 1971 and 2005, other studies reported sporadic occurrences of 'NAI-related' torn frena.[12-18]

STUDIES QUESTIONING ASSOCIATION OF FRENAL TEARS WITH NAI

Maguire et al in 2007[24] conducted a systematic review of articles in all languages related to torn labial frena in children. Reviewers, including paediatricians and paediatric/forensic dentists, found that only 19 of the articles published between 1950 and June 2006 met the inclusion criteria. They concluded that insufficient evidence exists to prove that a torn frenum is pathognomonic of child abuse. This highly regarded review, however, acknowledged several pitfalls. Firstly, available studies are of poor quality, being almost exclusively case reports/series with no means to conclude a cause-effect relationship. There was also no data on children with disabilities, a vulnerable group. Secondly, it excluded reports with intra-oral injuries attributed to sexual abuse. This might be a significant limitation, as more than 10% of

sexual abused cases may suffer from simultaneous physical abuse.[19] Finally, no comparative data was available for non-abusive torn frena. A recent update of the systematic review in 2014[20] added only one prospective observational study[21] and made few changes to the review's conclusions.

Lopez et al in 2014 examined 105 children in a paediatric intensive care unit within 24 hours of endotracheal intubation and found 12 with head and neck injuries. Of these, ten were diagnosed to be abuse cases but only one had a torn frenum.[21] However, intra-oral examination was performed with the endotracheal tube still in place, casting doubt on the accuracy of the oral examination.

Several large-scale studies reported similarly low incidences of intra-oral injuries, particularly torn frena, in physically abused children. This is in spite of a high overall proportion of injuries to the head, mouth, face and neck (Table I).[4-6,22]

Table I. Incidence of injuries to the head, mouth, face and neck.

Study	Total no. of physical abuse cases	Injuries to head/mouth/ face/neck (%)	Injuries to mouth (%)	Torn frenum (%)
da Fonseca et al, 1992[5]	502	75.5	4.4	0.4
Jessee, 1995[6]	266	66.2	2.6	0.0
Naidoo, 2000[22]	300	67.0	11.0	Unclear
Cairns et al, 2005[4]	390	59.0	0.3	0.3

A significant bias that was common in these reports is that dentists were rarely, if ever, involved in the examination. Despite its relative ease of access, unless the upper lip is cautiously everted, a torn upper labial frenum can be easily overlooked,[23] especially by physicians unfamiliar with the oral cavity.[4,5,22] Therefore, under-reporting of torn frena in abuse cases in the literature should be suspected. These suspicions were affirmed by Maguire

et al[24] who confirmed with Naidoo[22], the author of a study of oro-facial injuries in abused children, that torn frena had been not recorded, as it was seen as a 'trivial injury'.

Non-abusive causes for a torn frenum

Accidental causes of torn frena have been reported,[25-27] challenging the historic sweeping statement that an isolated torn frenum was diagnostic of NAI. Rare case reports offered explanations for abnormal-looking/torn frena (e.g. congenital anomalies and Riga-fede disease).[28,29] An odd-looking frenum in a child was considered to be a congenital anomaly associated with median diastema after similar findings were found in relatives.[28] Iatrogenic damage during endotracheal intubation has also been cited as a cause for torn frena,[30] although Lopez et al[21] found it to be a rare occurrence even with difficult intubations.

CONTEXT OF FRENAL INJURIES

A review of records in 2010 found that 3.5% of children with facial injuries sustained frenal tears, of which > 75% were due to a simple accidental fall. This study involves mostly ambulatory children.[31] It is plausible that a toddler can sustain accidental frenal injuries while learning to walk. In contrast, frenal tears in a younger and developmentally immobile child may be more suspicious, especially together with an inconsistent history. In the aforementioned case series by Thackeray,[11] all three victims of NAI were aged ≤ 4 months, while a systematic review showed that children with NAI-related torn frena are generally aged < 5 years.[20] Social risk factors such as a history of domestic violence, are important considerations that should raise red flags.

Tate in 1971 reported six cases with abusive facial injury, three of whom had a torn frenum.[12] The mechanism was described as a direct blow to the face in two cases, of which

one child was shaken and had her head struck against a fireplace several times. Concomitant injuries (i.e. fractures, intracranial injury, burns, bruises, bites or eye injuries) were common in cases of physical abuse.[20] However, the presence of multiple injuries is not an exclusive sign of NAI and can occur in accidents, such as road traffic accidents.[25]

MEETING FUTURE NEEDS

In summary, there is inadequate evidence to link an isolated torn frenum with NAI. However, there are severe limitations to studies available in the literature, not least of which is the lack of a dentally qualified examiner and thus possible under-reporting of intra-oral injuries. Conversely, there is also insufficient evidence to entirely dismiss all frenal injuries as accidental. This is especially so if patients present with multiple concomitant injuries, which are common in abused children.[4] Future studies should involve professionals familiar with the normal and abnormal oral mucosa and oral cavity.

Frenal injuries only comprise a small percentage of all types of oral injuries. Training is paramount for effective multidisciplinary child protection work and medical professionals need to be confident in performing intra-oral examinations for children with suspected abuse, or at least to recognise the abnormal and request a further dental opinion. Likewise, the high incidence of oro-facial injuries in abusive cases means that dental professionals should be trained in child protection so that they can be a valuable part of the multidisciplinary team. This includes training in identifying red flags for abuse, referral protocols for child protection and careful dental record-keeping. In Glasgow, an oral assessment framework and standardised form have been developed and successfully incorporated into the comprehensive medical assessments for children with safeguarding concerns.[32]

CONCLUSION

Child abuse is an intolerable crime but confirming its occurrence is a challenging and sensitive matter. One should not jump to premature conclusions as wrongful allegations can be distressing for the accused and family. On the other hand, an oversight of abuse can, at worst, be a matter of life and death. Hence, exclusion of NAI should only be done after comprehensive assessment, including meticulous history-taking and examination. Psychosocial factors, the age of the child and the mechanism of injury are factors to take into context. Features of concerns include inconsistent and implausible histories, multiple injuries and atypical child behaviour/carer-child interactions. These should prompt further child protection actions.[23]

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