ABSTRACT

**Purpose:** The low frequency of concomitant hypo-hyperdontia and the lack of established clinical protocols in treatment are our motives to analyse our experience in three different clinical cases and derive principles of clinical behaviour.

**Material and methods:** Analysis of the documentation of the 2886 patients, from which three clinical cases were with CHH: case 1 – agenesis of the second upper primary molars and hyperdontia of the upper left lateral; case 2 – Hyperdontia of the upper primary and permanent left lateral and hypodontia of the lower left second premolar; case 3 - two supernumerary (left and right) canines and hypodontia of the lower right second premolar.

**Results:** From all the patients diagnosed and treated by us, hypodontia was found in 7.38% (excluding third molar hypodontia); hyperdontia in 1.9% and only 0.1% have concomitant hypo-hyperdontia. In the three patients, hyperdontia occurs in the frontal segment, and the phenomenon of hypodontia covers the distal segments.

**Discussion:** Following the treatment plans of all three clinical cases, the following stereotype is required as a treatment approach: Solving the problem of hyperdontia (extraction); Levelling dental arches; Solving the problem of hypodontia - placement of implants or closing the space; Retention.

In practice, it is found that the solution starts with a relatively smaller problem - hyperdontia, especially in cases where we have access to these teeth. The more serious obstacle is hypodontia, which, if unilateral, leads to disruption of the occlusal ratios.

**Conclusion:** CHH is a rare problem, and the treatment is long, and its favourable outcome depends on early diagnosis.

**Keywords:** Hyperdontia, hypodontia, hypo-hyperdontia, supernumerary teeth

INTRODUCTION:

Concomitant hypo-hyperodontia (CHH) is a biological phenomenon that combines both a reduced number of teeth (hypodontia) and an increased number of teeth (hyperdontia) in one patient [1]. This orthodontic problem is extremely rare but creates a lot of difficulty in clinical decisions. These are embryological determined disorders [2] in the development and number of tooth germs, which allow in one person to be manifested simultaneously opposite processes - greater and lesser number of tooth germs. Ranges between 0.002% and 3.1% have been described in the literature [3,4]. Gokkaya et Kargul [5] reported a 0.7% incidence among Turkish orthodontic patients with greater male involvement. Agenesis is the most common problem in orthodontic patients in the range of 4.6 - 6.3% in Europeans [6] and 8.87% in Bulgarian orthodontic patients [7]. According to our study [7], the lower second premolars and the upper laterals are most affected by hypodontia, followed by the upper second premolars. When the frontal area is affected, in addition to an occlusal problem, an aesthetic component also accumulates. Clinical solutions are difficult, especially with a more graceful skeletal system and a requirement for the aesthetics of orthodontic appliances [8]. The most common area with hyperdontia is premaxilla. Various authors report prevalence in permanent dentition that varies from 0.5 to 3.8%, Demiriz et al. indicate 2.14% [9]. In our previous study, we found out that the prevalence of the supernumerary teeth is 1.82%, and the prevalence of mesiodens is 0.74% [10]. Exactly in the same area, hyperdontia is observed in concomitant hypo-hyperdontia [11, 12, 13]. Hyperdontia in the frontal segment drastically changes the position of the teeth and leads to occlusal disorders. If the disturbance in the number of teeth affects the distal segment, the difficulties come from the closed space, strongly inclined adjacent teeth or reduced transverse size of the alveolar ridge.

Our **Aim** is to develop the clinical principle for concomitant hypo-hyperodontia’s treatment based on three different clinical cases and to find out the frequency of this phenomenon across our patients.

**MATERIAL AND METHODS:**

We used orthodontic records and X-ray examinations of three patients with a proven form of concomitant hypo-hyperdontia. In the three patients, after a detailed family anamnysis, no changes in the number of teeth in the family were found. The analyzed three clinical cases with CHH have been diagnosed and treated in the last 6 years among 2886 patients in total. Two of the cases were boys, and one was a girl, the patients were aged 7 to 9 years. The cases
were documented by X-ray and CBST examination. The patients and the parents are familiar with the treatment plans which they have adopted. The survey data was processed with the statistical system SPSS 15.00 for Windows statistical software.

**Clinical case 1:**
A 7-year-old boy sought orthodontic treatment for rotated upper central incisors and diastema. After the clinical examination, it was found that the second maxillary primary molars were missing in the dental arch, and the first permanent molars had erupted through in close contact with the first primary molars. The anamnesis taken from the parents confirmed that no primary upper molars had been extracted and that they knew about their agenesis from their personal dentist.

**Fig. 1.** Initial status of the patient

An X-ray was ordered to provide information on the number of permanent tooth germs and to rule out any retention or ankyloses of the missing upper second primary molars. The x-ray showed agenesis of the upper second primary molars, but hyperodontia of the upper left lateral also was found (Fig. 1). In order to detail the shape of the crowns of the two laterals and the development of their roots, a CBST examination was ordered.

The CBST examination data showed that the medially located lateral was strongly axially rotated and palatally displaced; both laterals have normal root development and are almost the same size of their clinical crowns. Extraction of the more medially located lateral was ordered (Fig. 2). Two months after the surgery, we observed a natural eruption of the upper left lateral. The problem of hyperodontia was solved, but the more severe problem and its consequences remained - hypodontia of the upper second primary molars. Their absence has greatly reduced the perimeter of the upper dental arch, and this entails retention of the upper second premolars or treatment with extraction of the premolars. An orthodontic plan with premolar extraction should affect both jaws in order to achieve harmony in the number and size of the two dental arches and normal occlusal ratios. Therefore, it was decided to lengthen the perimeter of the upper dental arch by distalization of the upper molars with the Pendulum appliance (Fig. 3).

**Fig. 2.** After extraction supernumerary lateral

**Fig. 3.** Treatment progress in upper jaw
The last treatment phase is the levelling of the two dental arches and normalization of the occlusal ratios, which was achieved with a fixed technique.

**Clinical case 2:**
We present a clinical case of an 8-year-old boy with persistent two upper primary left laterals and erupted only central incisors. After an X-ray, hyperodontia of the upper left lateral and hypodontia of the lower left second premolar was established. The radiographs showed germs of the lower third molars. A CBCT study was ordered to detail the root development and crown size of the upper left laterals.

![Clinical and radiological status of the second patient](https://www.journal-imab.bg.org)

Fig. 4. Clinical and radiological status of the second patient

The two left laterals had full crowns and well-developed roots. They were located one behind the other, one of which was more palatally dislocated. Extraction of the two primary laterals and the palatally located supernumerary lateral was ordered, which unblocked the eruption of the normally located permanent laterally. In the second stage of treatment, extraction of the lower left second primary molar and directing a media eruption of the all lower left molars was planned in order to close the space of agenesis and introduce a third molar into the dental arch, which will compensate for the missing premolar.

**Clinical case 3:**
The patient is a 9-year-old girl who was brought for an orthodontic consultation due to a strong crowding of upper and lower frontal teeth. The orthodontic examination revealed an eruption of the lower right permanent canine with a vestibular position and a swelling of the alveolar ridge indicating the direction of its root strongly medially.

![Clinical and radiological status of the third patient](https://www.journal-imab.bg.org)

Fig. 5. Clinical and radiological status of the third patient

On X-ray, an accumulation of the multiple images in the lower frontal segment was observed, and a CBST examination was ordered.

The 3-dimensional study revealed the presence of two supernumeraries (left and right) canines and hypodontia of the lower right second premolar (Fig. 5). Radiologically,
there is evidence of germs of the third molars. The right supernumerary inferior canine is located obliquely and vestibular, with its coronal part, it prevents the eruption of the normally located canine and its root is located vestibular and medially so that it displaces the root of the lateral strongly lingual.

The left supernumerary mandibular canine is located even more obliquely. Its apex reaches almost to the median line in vestibular direction, and the coronal part blocks the eruption of the canine and the first premolar. The treatment protocol for this clinical case includes: an extraction of supernumerary mandibular canines; tracking and guiding the eruption of permanent teeth; distalization of the molars in the upper dental arch; levelling of the two dental arches; in the lower arch, the space of the missing right second premolar will be closed by medializing the three molars; adjustment of occlusal ratios and retention.

RESULTS:

Of the 2,886 patients diagnosed and treated by us, hypodontia was found in 7.38% (excluding third molar hypodontia); hyperodontia in 1.9% and only 0.1% (3 patients) have concomitant hypo-hyperodontia.

In the three patients, hyperodontia occurs in the frontal segment, and the phenomenon of hypodontia covers the distal segments.

Regarding the localization of the two opposite processes (supernumerary teeth and missing teeth), we observed the following: In patient one - both phenomena manifested only in the upper jaw; In patient two - in the upper and lower left half; In patient three - both deviations occur only in the lower jaw.

In the two boys, the hyperodontia affects the upper left lateral, while in the girl - the lower left and right canines. In one patient, the hypodontia affected the second upper primary molars, while in the other two cases, one lower second premolar. This localization of hypodontia in the mixed form of CHH coincides with the most common localization of true hypodontia – the lower second premolar. When the process is only on one side, it creates more difficulty for clinical decision and treatment.

In two of the patients, we observed changes in both dentitions. In patient one, hypodontia occurs in primary dentition and hyperodontia in permanent dentition, with the occlusal disturbances being significant. In patient two, we observed hyperodontia in both primary and permanent dentition with the same localization - upper left lateral.

In the first clinical case, early diagnosis provided an opportunity for a treatment plan by which we achieved elongation of the perimeter of the upper dental arch with the size of two premolars, and the patient was cured without extraction, good occlusal ratios between the two jaws were preserved, and a complete permanent dentition was formed. The difficulty during treatment comes from the minimal support area (only two premolars and the hard palate) for the action of the Pendulum appliance, which made the distalization of the molars one after the other necessary. The achievement of a complete occlusion with all permanent teeth gives the patient a beautiful and wide smile.

In the second patient, hyperodontia affects the upper left segment, and hypodontia affects the lower left segment. These are conditions contributing to occlusion disorders if not diagnosed because one would overdevelop its upper quadrant, while hypodontia could cause dental ankyloses and bone undevelopment in the lower quadrant. Therefore, the early diagnosis helped us interfere in the overdevelopment of the upper frontal segment and to disrupt the occlusal ratios by extracting the primary left laterals and supernumerary lateral. This process ensured a normal eruption of the remaining teeth in the region.

The treatment lasts a long time because it is associated with the complete formation of the permanent dentition, controlling and directing the eruption of the lower left second molar and the medialization of the first molar.

In the third clinical case, we observed an unfavourable position of the supernumerary lower canines, which disrupted the eruption of the permanent lateral teeth and changed the topography of the lower alveolar ridge. Vestibular these canines are covered with a thin compact and their roots are located medially to the mandibular medial line, which makes their extraction difficult. After their surgical removal, we observed a normal eruption of permanent teeth and achievement of good healing results.

DISCUSSION:

In our study, the number of boys affected by CHH was twice as high as that of girls, and this data coincides with the results reported by Zadurska et al. [2]. Most often, the lower second premolars were affected by hypodontia, and the same conclusion is published by other authors [3].

Although there are not many publications on the subject in the literature, we found a wide range of approaches, but each of them emphasizes the complex variety of problems that are concomitant: a difficult eruption of adjacent teeth, dental transposition, conditions for tooth retention, root resorption of teeth, ectopic breakthrough and others [11]. Therefore, the publication of each new case enriches the orthodontic community with a new clinical approach or confirms one.

Following the treatment plans of all three clinical cases, the following stereotype is required as a treatment approach:

- Solving the problem of hyperodontia (extraction of supernumerary teeth)
- Formation of support zones and zones of active movement; Levelling dental arches
- Solving the problem of hypodontia - placement of implants or closing the space by medialization of the posterior teeth
- Retention

In practice, it is found that the solution starts with a relatively "smaller problem " - hyperodontia, especially in cases where we have access to these teeth. Quite often, in hyperodontia, there is retention of the teeth, which can be explained by the reduced space in the dental arch for the eruption of both teeth. Therefore, it is necessary to resolve hyperodontia to ensure a normal tooth eruption. If the moment of a natural eruption of the teeth is missed and the ex-
traction of the supernumerary tooth is delayed, then the treatment can be complicated by the clinical stage of orthodontic traction of the impacted tooth. Making a good assessment which one of the teeth to be extracted and which ones to insert into the dental arch, we always take into account the shape and size of its clinical crown. It is important to avoid the problem of tooth-to-tooth mismatch after leveling the two dental arches.

The more serious problem is hypodontia, which, if unilateral, leads to disruption of the occlusal ratios or even to compensatory extractions. Therefore, the occlusal ratios are leading in the clinical decision making. In the presence of lower third molars and early diagnosis of hypodontia, the early extraction of the primary second molar and guiding medial eruption of the permanent molars can be performed in order to close the space and perform an arrangement only with one’s own teeth. Such a decision was made within the second and third clinical case.

The patients have difficulties accepting the idea of extracting one’s own teeth (even if they are too many) and placing an implant. They do not understand this phenomenon of aggregation of the two opposites (hypodontia and hypodontia) and believe mathematically that they are neutralized.

Another real problem for orthodontists is that if the problem is detected early, the treatment should be started. It starts with the extraction of supernumerary teeth, but to solve the problem of hypodontia, it requires a complete formation of permanent dentition, which makes these treatments very long and engaging.

CONCLUSION:
Concomitant hypo-hyperodontia is a rare problem in the number of teeth but gives serious occlusal and aesthetic disorders. The treatment of the problem is long, and its favourable outcome depends on early diagnosis. A complete diagnosis of the concomitant hypo-hyperodontia is possible only on the basis of X-ray examination, as some teeth may be retained, transposed or missing.

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