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CASE REPORT

# Orthodontic Evaluation and Craniofacial Characteristics of a Patient with Dubowitz Syndrome: A Case Report

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## Abstract

This case report presents the orthodontic evaluation and treatment planning of a patient with Dubowitz syndrome, an autosomal recessive inherited and rare genetic disorder characterized by microcephaly, growth retardation, high sloping forehead, facial asymmetry, micrognathia, deep palate, blepharophimosis, sparse hair and eyebrows, low ear and mental retardation. The male patient, with a chronological age of 8 years and 2 days, was referred to our clinic due to severe overjet and mandibular retrognathia. Radiographic and clinical evaluations revealed deep palate, narrowness of maxillary and mandibular arches, mandibular micrognathia, speech difficulties and mixed breathing. The patient's treatment planning was aimed at function and phonation and included the use of a twin block appliance with expansion screw in both parts and simultaneous use of occipital headgear (350 g force on one side). It was aimed to positively direct the growth in the craniofacial structure by making use of the continuation of the patient's growth and development period, and to prevent interventions such as surgical-assisted rapid maxillary expansion and orthognathic surgery, which are invasive approaches in adulthood.

**Key words**: Dubowitz syndrome; Growth retardation; Micrognathia; Microcephaly.

## Introduction

Dubowitz syndrome is a rare disease characterized by microcephaly, growth retardation, a highly sloping forehead, facial asymmetry, blepharophimosis, sparse hair and eyebrows, low ears, and mental retardation.[1] It was first clinically described by Viktor Dubowitz in 1965.[2] The cause of this autosomal recessive disease is not known exactly.[3] While the majority of cases are observed in the Caucasian race, the incidence is similar in men and women.[4–6] It has been reported that the families of individuals affected by the syndrome have healthy and unrelated marriages.[7] Narrow face, micrognathia, dental anomalies, cleft palate, nasal bridge at the same level as the forehead, posteriorly angled ears and palate anomalies are observed in patients affected by Dubowitz syndrome.[5,6,8] When a cleft palate is present, it is usually in the form of a submucosal cleft. Other symptoms are delayed eruption, crowding and misalignment, midline diastema and rotated mandibular incisors.[4–6] Telecanthus hypertelorism, ptosis and/or blepharophimosis are observed in the eyes and periorbital area. Epicanthal folds and strabismus have been reported.[5,6] In addition, eczema, cardiovascular problems and scoliosis can be seen in these patients.[7–9] Behaviorally, these patients may experience lack of attention, aggression, shyness, discomfort from crowded environments, food refusal, and bedwetting.[10] One study reported that the NSUN2 gene was the first gene associated with the Dubowitz phenotype.[11] Some studies have shown that LIG4 may be responsible for the disease[12], while others have reported an association of the phenotype in Ch14q32 with Dubowitz syndrome.[13] Small number of patients with Dubowitz syndrome reported to date. Therefore, the aim of this case report was to contribute to science and to raise awareness of the importance of early orthodontic treatments for orthodontists, dentists, medical doctors and laypersons who have relatives diagnosed with Dubowitz syndrome.

## Case Report

The male patient, who had a chronological age of 8 years and 2 days, was referred to the Department of Orthodontics, Ankara University due to severe overjet and mandibular retrognathia. The patient was in the early mixed dentition period. In the anamnesis, it was learned that he started walking at the age of one, received special training for language and speech difficulties and did not use any medication. It has been observed that he made single words and some two-word sentences that were difficult to understand. When the patient's examinations at Ankara Dr. Sami Ulus Gynecology, Childhood Health and Diseases Training and Research Hospital were evaluated, it was learned that he had bilateral undescended testicles, micropenis findings and that the parents were sibling grandchildren. Minimal left scoliosis, which was also thought to be positional, was sus-



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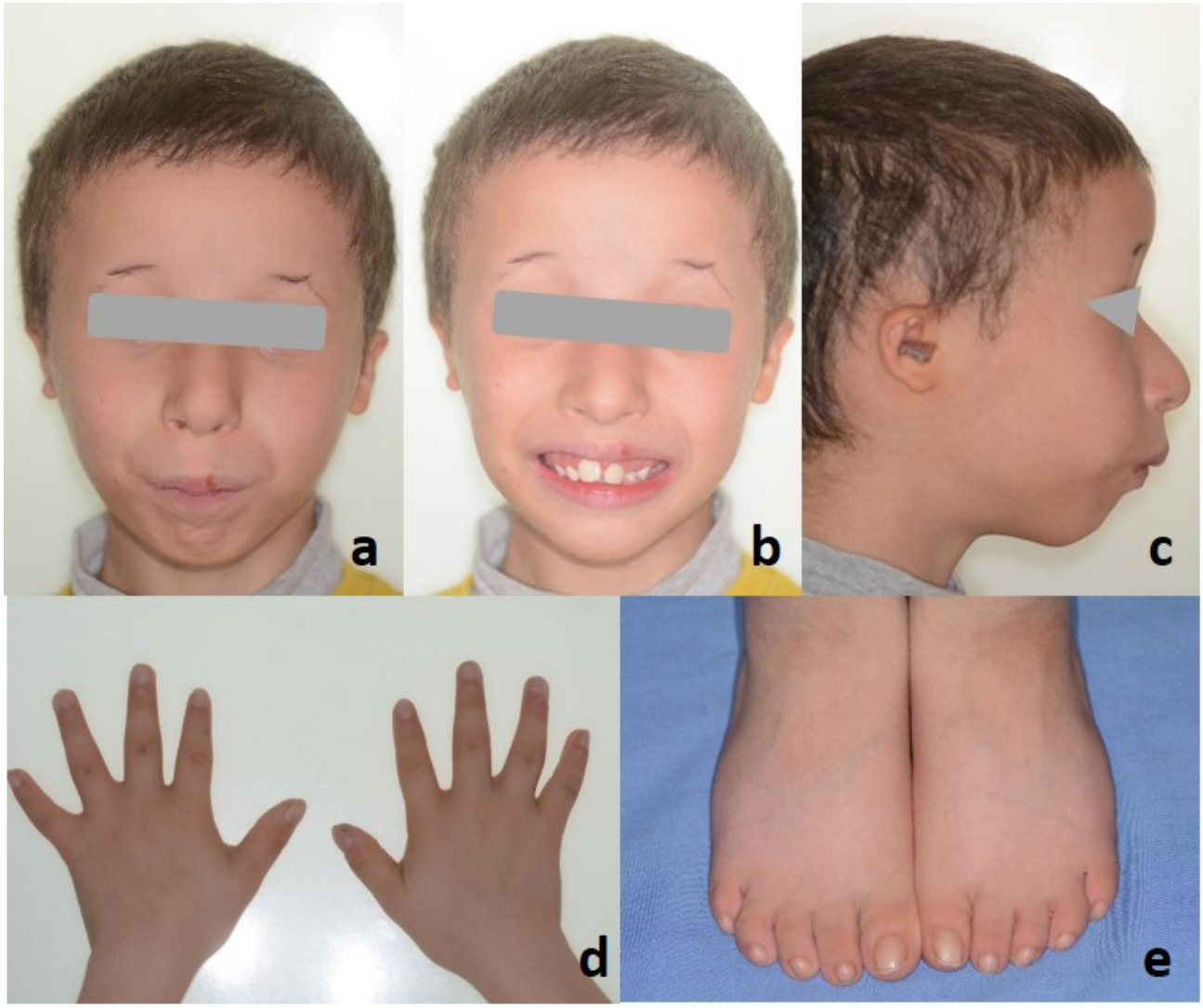


**Figure 1.** Extraoral photographs. **a.** frontal view, **b.** frontal view while smiling, **c.** lateral view. **d.** hands and **e.** feet.

pected on bilateral thoracolumbar vertebra X-ray. In the 5 alpha reductase gene analysis of the patient, heterozygous rs522638T>C polymorphism of the SRD5A2 gene was detected and no mutation was observed. Along with extraoral photographs taken during his clinical examination, low and small ears, microphthalmia, thin eyebrows, short fingers and toes were detected (Figure 1).

In the intraoral photographs, it was seen that the patient was in early mixed dentition, and constricted maxillary and mandibular arches. Ten millimeters of dental crowing was measured for both the maxillary and mandibular dental arches. The overjet was 8 mm and the overbite was 5 mm. Multiple caries lesions were observed. The palate was deep and oral hygiene was poor (Figure 2). Orthopantomograph, cephalometric radiography and hand-wrist X-ray were taken for radiological examination (Figure 3). When the orthopantomograph was examined, caries lesions were detected and all permanent tooth germs were formed. According to the hand-wrist X-ray, the patient is in the pre-PP2= stage (very early growth stage). According to this result, it is understood that the skeletal age of the patient was delayed compared to the chronological age and the same-sex peers. According to the results of cephalometric radiographs, it was determined that the maxilla was ahead of the cranial base, the mandible was behind the cranial base, and the mandibular effective length and lower face height increased. It is also noteworthy that the airway has narrowed. The cephalometric analysis values are presented in Table 1 and Table 2.

**Table 1.** Skeletal Lateral Cephalometric Measurements

| Skeletal Parameters | Normal Values | Patient |
|---|---|---|
| SNA (°) | 82 | 81.7 |
| SNB (°) | 80 | 71.8 |
| ANB (°) | 2 | 9.9 |
| SN/GoGn (°) | 32 | 48.4 |
| ANS-Me (mm) | 46-47 | 51.2 |
| N.Perp-A (mm) | 0-1 | 3.6 |
| Co-A (mm) | 58 | 60.9 |
| Co-Gn (mm) | 53-56 | 70.8 |
| Maxillomandibular Difference (mm) | 2-5 | 9.9 |
| FH-GoGn (°) | 21.3 | 35.3 |
| N.Perp-Pog (mm) | (-2)-2 | -13.7 |
| Pog-NB (mm) | 0 | -6.7 mm |

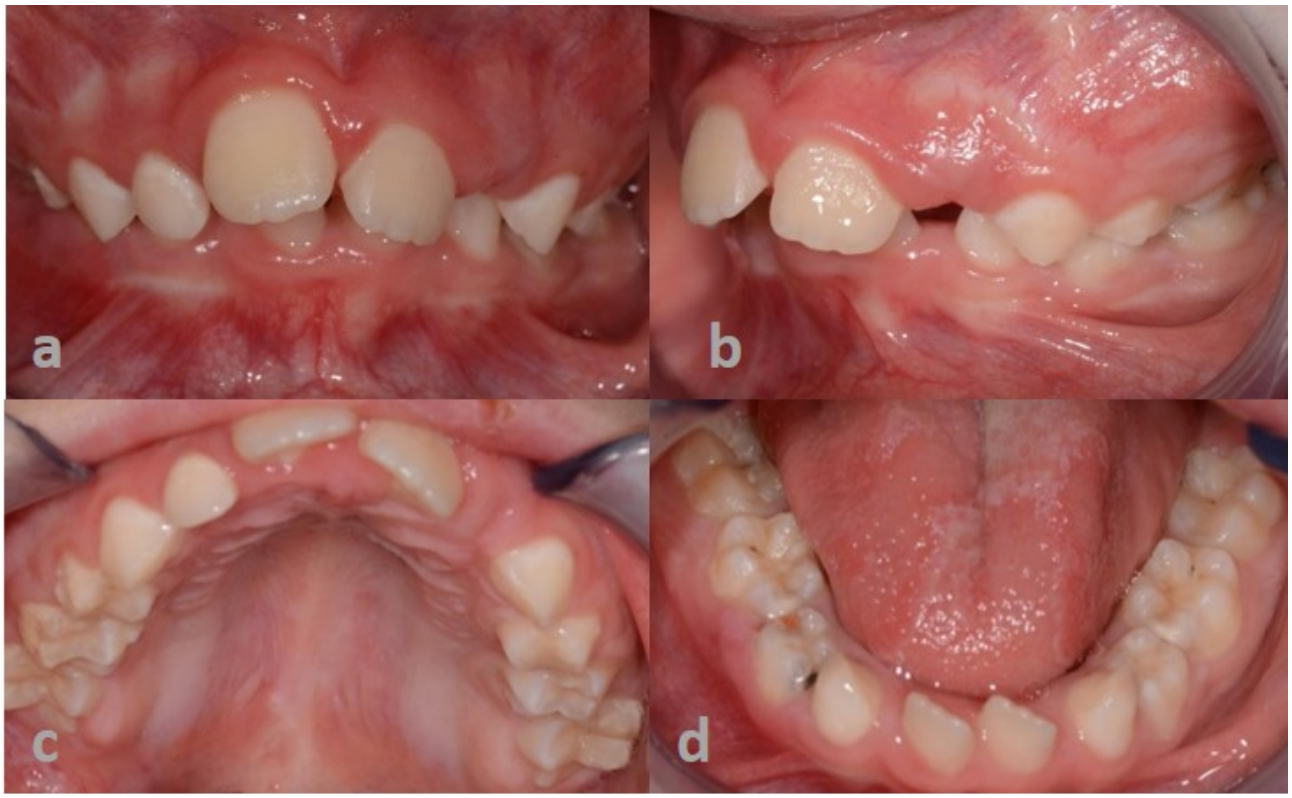


**Figure 2.** Intraoral photographs. **a.** frontal view, **b.** lateral view (overjet), **c.** maxillary occlusal view and **d.** mandibular occlusal view.

**Table 2.** Dental Lateral Cephalometric Measurements

| Dental Parameters | Normal Values | Patient |
|---|---|---|
| U1-NA (mm) | 4 | 2 |
| U1-NA (°) | 22 | 24 |
| L1-NB (mm) | 4 | 4.8 |
| L1-NB (°) | 25 | 32.4 |
| Occ Plane to SN (°) | 14 | 31.2 |
| Interincisal Angle (°) | 131 | 113.7 |
| IMPA (°) | 90 | 90.8 |

### Treatment Goals

The following treatment goals were set: • Facial aesthetics: Improving the convex profile; correction of skeletal relationship. • Tooth structure: Expansion of the maxillary and mandibular arches, providing space for teeth that cannot erupt due to lack of space, elimination of increased overjet, alignment of teeth. • Improving function and phonation.

### Treatment Planning

It is possible to observe symptoms of developmental deficiency, microcephaly, facial dysmorphism, posteriorly angled ears, micrognathia, and crowding in the teeth in the patient who was diagnosed with Dubowitz syndrome, who applied to our clinic. After the patient's existing carious lesions are treated, the twin block appliance and simultaneous occipital headgear will be applied to the patient. While mandibular advancement is aimed with the twin block appliance, it is aimed to expand the maxillary and mandibular dental arch with the slow expansion protocol by adding expansion screws to the upper and lower plates. Occipital headgear, on the other hand, will be applied unilaterally with 350 gr (700 gr force in total) and it is aimed to inhibit the growth and development of the maxilla.

### Treatment Timing

There are two different treatment-timing approaches in individuals who are planned to stimulate mandibular development with functional appliances. Initiating the use of devices just before the peak of the growth and development process and obtaining maximum benefit in a minimum time, or initiating treatment as early as possible in order to avoid trauma to the maxillary incisors and to relieve the constricted pharyngeal airway by mandibular advancement. In our patient, we aimed to avoid the risk of trauma and to adapt the soft tissues by starting the treatment early. However, we had to postpone the orthodontic treatment for a while due to our patient's cardiological controls and hearing-related problems. In addition, many decayed teeth of our patient need to be treated with sedation. However, due to the general health condition of our patient, the sedation application was also postponed. Although we have not yet started active orthodontic treatment of our patient due to the reasons mentioned above, we believe that it is beneficial to start treatment as soon as possible in our patients with such problems.

## Discussion

In patients diagnosed with Dubowitz syndrome, primarily eye defects, craniocervical anomalies, cardiovascular defects and hearing problems have been noted.[4,14,15] Problems such as dental malocclusions and micrognathia remained in the background. Whereas, respiration and nutrition start from the mouth. Although this syndrome, which causes many skeletal and dental symptoms, is rare, it is important in orthopedic and orthodontic terms. For this reason, it is extremely important to increase the awareness of orthodontists. Optimizing patients in terms of function, phonation and aesthetics requires a detailed examination and case-specific planning. It is im-

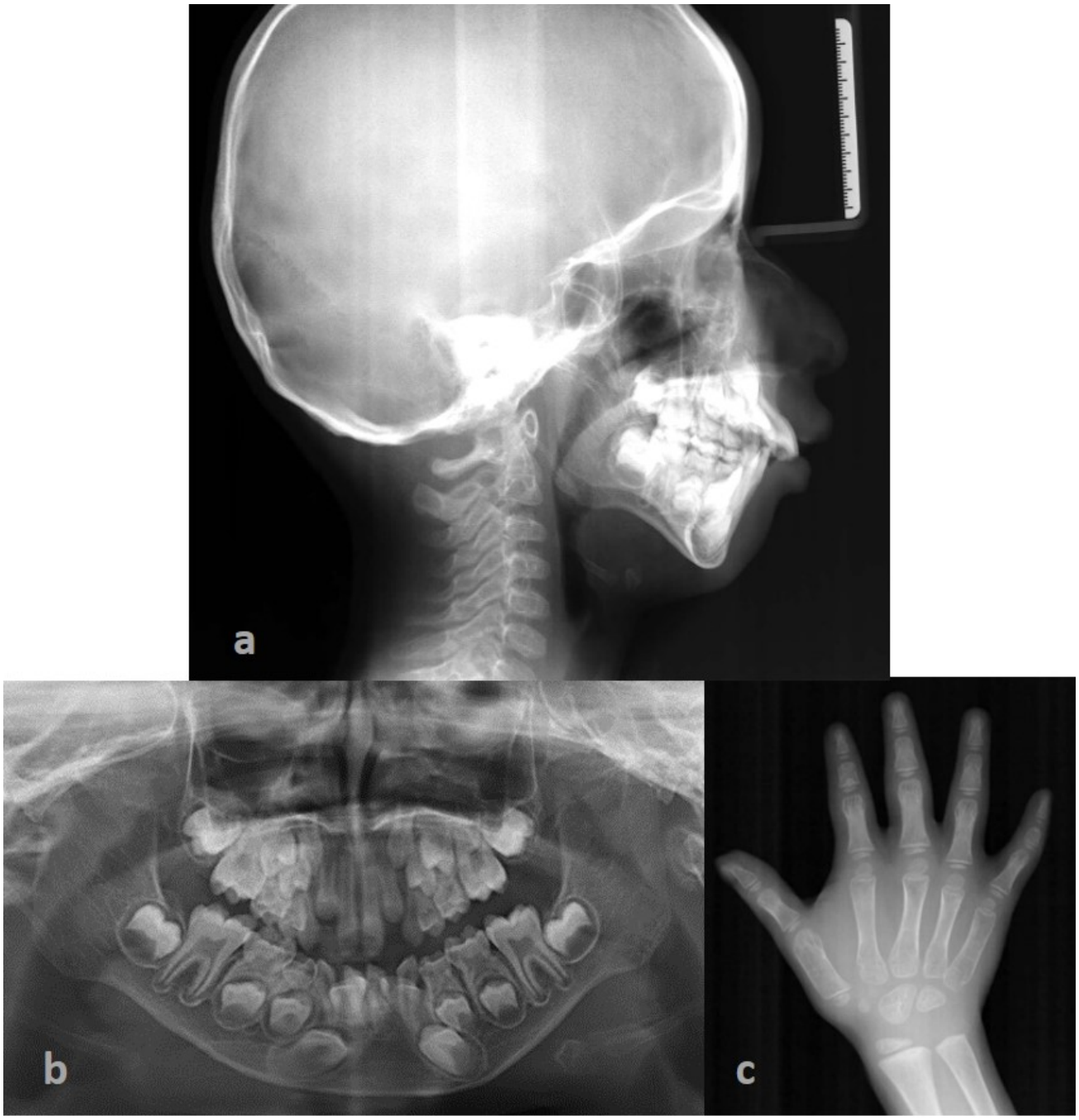


**Figure 3.** Radiographs. **a.** Lateral cephalometric radiograph, **b.** orthopantomograph, **c.** hand-wrist radiograph.

portant to determine and apply the most appropriate treatment for these patients who are currently lacking in cooperation. Orthopedic treatments to be applied to patients diagnosed with Dubowitz syndrome during the growth and development period can expand the airway volume and improve respiratory habits, and with orthodontic treatments, dental malocclusions are corrected, and nutritional habits are improved. In addition, with the application of early diagnosis and treatment, approaches such as surgical-assisted rapid maxillary expansion and orthognathic surgery, which are invasive approaches in adulthood, are prevented.

## Conclusion

In the patient who applied to our clinic, due to insufficiency in maxillary and mandibular arch length and width, deep palate and micrognathia, because of early orthopedic and orthodontic treatments, it was aimed to improve respiration by increasing airway volume, and to improve nutritional habits and phonation. Considering all these, it is of great importance that patients diagnosed with Dubowitz syndrome in the early period are referred to orthodontists.

## Author Contributions

Z.G. principal doctor of the patient, literature review and writing of the manuscript ; A.T.A. supervisor of the patient and writing of the manuscript

## Conflict of Interest

The authors declare no conflict of interest.

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