Cockayne sendromu; bebek ve çocuklarda gelişme geriliği ve mental retardasyon ile seyreden, otozomal resesif geçişli, nadir görülen bir sendromdur. Multisistemik sorunlar yanısıra kusma nedeniyle yaygın çürüklere olan bu oğuların diş tedavileri dikkatli bir değerlendirme sonrası sedasyon altında yapılmalıdır. Anesteziye ait başlıca sorunlar havayolu açıklığının sürüldürülmesinde güçlük ve gastrik aspirasyon riskinin artmasıdır. Cockayne sendromlu olgunun sedasyon altında uygulanan diş tedavisi sunulmuştur.

Cockayne’s syndrome is a rare autosomal recessive condition producing a dwarfed, mentally retarded infant or child. After precise examination, dental treatment of cases having rampant caries due to vomiting in addition to multisystemic complications should be carried out under sedation. Problems with airway management and an increased risk of gastric aspiration are the main anaesthetic concerns. Dental treatment applied under sedation to a patient with Cockayne syndrome is described.

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**KEYWORDS**

*Cockayne sendromu, Çocuk diş hekimliği, Sedasyon*

**ANAHTAR KELİMELER**

*Cockayne’s syndrome, Paediatric dentistry, Sedation*
INTRODUCTION

Cockayne Syndrome (CS) is an autosomal recessive, genetic disorder characterized with multisystem involvement, progressive and intense neurological impairment described by Cockayne in 1936\textsuperscript{1,2}. In the classical form of Cockayne syndrome (Type I), the symptoms are progressive and typically become apparent after the age of 1 year. An early onset or congenital form of Cockayne syndrome (Type II) is apparent at birth. Manifestations of CS are including heterogeneous, possibly multiple genetic and biochemical defects\textsuperscript{3}. This syndrome occurs with a frequency of 1/100,000 in live births and can be caused by mutations of two genes, the Cockayne Syndrome Type I (CKN1) or Excision-Repair Cross-Complementing Group 8 (ERCC8) and the Excision-Repair Cross-Complementing Group 6 (ERCC6), located on chromosomes 5 and 10q11 respectively\textsuperscript{4}. Some of the most common somatic and clinical features are growth failure after a normal delivery, microcephaly, facial dysmorphism, mental retardation, neurodevelopment and later neurological dysfunctions, cutaneous photosensitivity of the skin including pigmentary retinopathy, neurosensory hearing loss, dental caries, hypertension, atherosclerosis and renal disease\textsuperscript{5}, whereas these characteristic appearances have been seen is called “characteristic dwarfism”\textsuperscript{6}. Patients have a characteristic bird-like face caused by loss of subcutaneous fat, especially over the cheeks. Enophthalmos, a beak-like nose and large ears are the other clinical findings\textsuperscript{4}. A few patients have survived for up to 20 years, death usually occurs before the age of 12 years\textsuperscript{2}. The usual oral findings are delayed deciduous teeth eruption, congenital absence of some permanent teeth, partial macrodontia principally of the central incisors, dental hypoplasia, short roots, more incidence of caries, a deep plate, atrophy of the alveolar processes, mandibular prognathism and condylar hypoplasia\textsuperscript{4,7,8}. Since rampant caries is a source of infection in addition to adverse effects on nutrition, dental treatment is necessary in such cases. Because of the multisystemic anomalies, dental treatment of CS cases are suggested under general anesthesia or sedation techniques with close observation\textsuperscript{1,2,9}. In this report we aimed to present the dental treatment planning of a CS case, aspects and clinical implications of the dental treatment planning in view of literature findings.

CASE REPORT

In this case report we present a 7-year-old patient. He had a height of 82 cm, weight of 7.1 kg, head circumference of 26 cm and blood pressure of 110/85 mm/Hg. The patient had a full term perinatal problems. At the age of 36 months he was diagnosed as having CS. He appeared to have cachectic habitus, hypnosis, sunken eyes, a thin and beaklike nose, lack of subcutaneous cheeks fat and large ears, giving the patient a “birdlike” appearance. He had motor and mental retardation. Other physical findings include thin atrophic hyperpigmented skin with sensitivity to sunlight, limitation of joint mobility of the legs and lower back, scoliosis, decreased sweating and tearing, sparse hair, low set ears, cool hands and feet and sometimes cyanotic, cataracts and premature calcifications especially of the central nervous system but not renal disease. He had a history of nasogastric feeding, and regurgitation or vomiting after meals. In the oral cavity examination we found dry mucosa, deeply arched palate, deficient hygiene and gingivitis. Eruption of 31, 41 teeth were total, while 11 and 21 teeth were partial. Teeth rotation of 11 and 21, macrodontia of 11, 21, 31 and 41 teeth were observed. The 55, 54, 53, 52, 62, 63, 64, 65, 72, 73, 74, 75, 82, 83, 84, 85 had caries, 36 and 46 teeth had hypoplasia. In addition to mandibular and condylar hypoplasia, atrophy of the alveolar processes were detected (Figure 1, 2). Health histories were reviewed, and American Society of Anesthesiologists (ASA) status was assigned (ASA III) (Table I). In case of respiratory depression, blood vessel access equipment, orotracheal entubation devices and laryngeal mask were ready to use. Midazolam (Dormicum®) was...
administered orally, dosed at 0.3 mg/kg per appointment. Nitrous-oxide/oxygen (N₂O/O₂) was administered by means of a nasal hood and titrated to the level that would allow completion of treatment and child cooperation. The N₂O gas mixer was set up to limit a gas flow to no higher than a maximum N₂O concentration of 30%. In this case, recorded vital signs included heart rate (HR), oxygen saturation (SpO₂), systolic and diastolic blood pressure (SBP/DBP), and electrocardiography as determined by pulse oximetry, noninvasive blood pressure monitoring, and electrocardiography (ECG) (Figure 3). The sedation plane was reviewed by Ramsay Sedation Scale (RSS) ¹⁰. Since all of the primary incisors were non-restorable due to rampant caries, 51, 52, 62, 73, 74, 75 teeth were extracted with local anaesthesia. Vital sign recordings are presented in Table II. Length of treatment lasted 30 minutes, and sedation level was 3-4 according to RSS. The patient was still fed with the bottle. The parents were advised to brush his teeth twice daily and consume fluoride supplements. The patient came to appointment after 6 months (Figure 4,5).

<table>
<thead>
<tr>
<th>Classification</th>
<th>Clinical status</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>A normal healthy patient</td>
</tr>
<tr>
<td>II</td>
<td>A patient with mild systemic disease</td>
</tr>
<tr>
<td>III</td>
<td>A patient with severe systemic disease</td>
</tr>
<tr>
<td>IV</td>
<td>A patient with severe systemic disease that is a constant threat to life</td>
</tr>
<tr>
<td>V</td>
<td>A moribund patient who is not expected to survive without the operation</td>
</tr>
<tr>
<td>VI</td>
<td>A declared brain-dead patient whose organs are being removed for donor purposes</td>
</tr>
</tbody>
</table>

FIGURE 1
Clinical appearance

FIGURE 2
Intra oral appearance

FIGURE 3
Under sedation
DISCUSSION

In patients with CS, certain preoperative investigations are necessary. Since renal disease is associated with this syndrome, assays of plasma potassium and renal function tests would have been useful to determine the level of renal dysfunction. Further, because CS is associated with hypertension and atherosclerosis, an ECG may reveal any existing ischemia. Our patient’s mean blood pressure was 112.3/59 mmHg, which was the normal value. This data was important as it reflected the patient’s general health. The systolic and diastolic blood pressure in a 9 year-old child should be approximately 97-112/57-71 mmHg. The episodes of hypertension that occurred in this patient were not extremely high-level accordingly this blood pressure. In order to eliminate the effect of anxiety on blood pressure, we prescribed midazolam as anxiolytic and sedative premedications. Orally administered sedatives are well accepted by children and are usually perceived as not threatening. Oral sedation is complicated by variable absorption and the inability to titrate the dose to the desired effect, characteristics that may produce unpredictable levels of sedation. Benzodiazepines are a commonly used class of sedative agents. Midazolam, a newer-generation benzodiazepine, has a wide toxic/therapeutic ratio and margin of safety and does not produce the prolonged sedation associated with other benzodiazepines.

such as diazepam. Midazolam has been shown to enhance anterograde amnesia when used preoperatively in pediatric patients. Despite the widespread acceptance of N₂O and the increasing usage of oral midazolam in pediatric dentistry, little has been reported on the overall safety of these agents in the pediatric dental patient population. Nitrous oxide is widely used because of its provision of a significant analgesic effect with minimal respiratory depression at concentrations less than %50. Recognized adverse reactions such as nausea and vomiting have been reported, but Houck and Ripa suggest that children have a natural tendency to vomit easily that is unrelated to eating before treatment, concentration of N₂O, or duration of the sedative procedure. This suggests that the incidence of vomiting can be predicted by a history of hyperemesis, which should be noted in the medical
history. In this case, we did not observe nausea or vomiting in patient receiving midazolam and N\textsubscript{2}O. Nitrous oxide has been reported to cause a decrease in both systolic and diastolic blood pressure\textsuperscript{16}. In this case, both systolic and diastolic blood pressures were observed to remain stable throughout procedures performed under the conditions described. In CS, the most common anesthetic problem encountered has been difficult orotracheal intubation because of a small mandible, small mouth with relatively large teeth, limited temporomandibular joint movements, or subglottic stenosis. There were no cardiovascular and respiratory problems during the sedation and post sedation period. Concerning CS, there have been some reports of difficult airway, laryngospasm, aspiration of gastric contents and others. It is important to prevent respiratory failure by keeping the adequate depth of sedation\textsuperscript{9}. This case confirms the findings of a high arched palate but did not demonstrate any crowding. This patient was in the full primary dentition rather than the mixed dentition where crowding was reported\textsuperscript{6}. In 1987 Cantani and coworkers reviewed 129 cases of CS, having 38.4% carious teeth and 22.4% prognatism. There was no mention of any ethnic breakdown on these patients\textsuperscript{6,10}. The case of a 9-year-old white female that Cook\textsuperscript{17} reported had a retruded mandibular position similar to like this case presented. The dentistry community should look for signs and symptoms in the oral cavity in order to diagnose the development of the syndrome and provide adequate treatment\textsuperscript{4}. Being autosomal recessive, CS is a serious disease causing death at early years of life. After precise examination, dental treatments of cases having rampant caries due to vomiting in addition to multisystemic complications should be carried out under sedation by multidisciplinary approaches.

REFERENCES