

SYSTEMIC STEROIDS FOR THE MANAGEMENT OF OBSTRUCTIVE SUBGLOTTIC HEMANGIOMA,

Saudi Journal of Oto-Rhino-Laryngology Head and Neck Surgery, Volume 10 No.1

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Abstract:

Objectives; to evaluate the effect of systemic corticosteroids on the management of congenital subglottic hemangioma (CSH).

Patients and methods; seven consecutive infants with the diagnosis of CSH were managed at King Abdulaziz University Hospital (KAUH), Riyadh, Saudi Arabia, between September 1999 and December 2007. All of the cases were treated with an oral prednisone (dose of about 1mg/kg every other day for a variable period of time, after starting a daily high dose of 3 mg/kg for 10 days). The outcome of the treatment was evaluated as well as the possible complications.

Results; all of the cases were successfully treated with the systemic steroids except for one case, which is currently under treatment. Only one of the cases developed cushingoid face.

Conclusion; Systemic corticosteroids can be one of the treatment options that may result in overcoming the distressing airway presentation of CSH. Careful monitoring and small dose with an alternating day course of systemic corticosteroids may reduce the possibility of complications as well as avoid growth retardation.

Key words; hemangioma, subglottic hemangioma, steroids, stridor.

Introduction:

Congenital subglottic hemangioma (CSH) was first described in 1912 by Phillips and Ruh.¹

Hemangioma occurs in about 1 out of 100 Caucasian birth, with one half occurring in head and Neck.²

The exact incidence of subglottic hemangioma is not documented but it constitutes about 1.5 % of all congenital laryngeal anomalies.³

CSH is a neoplastic lesion characterized by endothelial hyperplasia.⁴ It is predominantly capillary type which is characterized by proliferation of capillary endothelial cells, multilamination of the basement membrane and accumulation of mast cells, macrophages, plasma cells, and pericytes.⁵

These lesions demonstrate rapid post-natal growth (Proliferative phase) lasting 3 to 9 months, followed by slow complete involution (involution phase) in nearly 100% of the cases within 12 years.^{2,6}

CSH usually does not cause symptoms at birth; there is a symptom-free interval that could last from weeks to months. Most infants present before 6 months of age.

The symptoms consist mainly of episodic biphasic stridor that is commonly misdiagnosed with recurrent croup.⁷

Other signs, such as feeding difficulties, dyspnea, apnea, and cyanosis may develop.

Cutaneous hemangioma associated with 50% of the patients and its presence in an infant with stridor is suggestive of subglottic hemangioma especially in the 'beard region including; the preauricular area, chin, anterior neck, and lower lip.^{8,9}

Diagnosis of CSH is suspected based on history and physical examination. The diagnosis is confirmed by direct laryngoscopy and bronchoscopy, which usually reveals a soft submucosal mass covered with normal appearing respiratory epithelium. The lesion may have reddish or bluish hue.^{9,10}

In this study we attempted to evaluate the effectiveness and safety of use of systemic corticosteroids in treatment of CSH.

Material and methods:

The study involved all the infants with the diagnosis of CSH that were managed at King Abdulaziz university hospital in Riyadh, Saudi Arabia between July 1999 and December 2007. The study was carried out to assess the role of systemic corticosteroids in the management of this disorder.

The clinical presentation for all of the cases was reviewed. All of the infants had undergone a direct rigid laryngobronchoscopy under general anesthesia. Intraoperative finding (site, size, extension, and the percentage of the obstruction by the hemangioma) was recorded.

The protocol of systemic corticosteroids involved the initiation of intravenous dexamethasone immediately postoperatively with an initial high dose of 1 mg /kg /day. Three days later, the infants were switched to the corresponding oral dose of prednisone (3 mg /kg /day) for 10 days then prednisone was tapered to the lowest dose that kept the patient asymptomatic. The oral prednisone dosage was then kept in the range of (0.5 to 2 mg/kg) every other day for a variable duration of time according to the need of the patient.

The dosage was increased when there was an anticipated risk of additional airway compromise as in case of upper respiratory tract infection.

All of the cases were discharged from hospital when they were asymptomatic within a period of 4- 7days. Subsequently the children were followed by the otolaryngologist and endocrinologist as an out patient to adjust the steroid dosage to the lowest effective dose and to monitor for potential adverse side effects that could ensue from the systemic steroid therapy.

Body weight and height were monitored, to record any growth retardation thought the follow up duration.

Gradual cessation of the steroid usually started after the complete disappearance of symptoms and not before 6 months to cover the proliferative phase of the hemangioma. The duration of steroid treatment, complication and patients follow up all were reviewed.

Results:

A total of 7 infants with the diagnosis of CSH constituted the total number of the cases. In our series, 6 (85.7%) of these children were girls and one (14.2%) was boy. (Table 1) The age at the time of presentation ranged from 4 weeks to 7 months, 6 (85.7%) of these children presented at the age of 4 months or younger and only one case presented at the age of 7 months (table 1). Extra laryngeal hemangiomas were seen in all of the infants at different location of the body, with the face and neck involved in all of the cases. All of the infants presented with respiratory symptoms; the most common of which was stridor (100%), two patients (28.5%) had recurrent cyanosis and one patient had recurrent croup (14.2%), and feeding difficulty in about 50% of cases (table 1).

All of hemangiomatous lesion involved the posterior wall of the subglottic region. Involvement of other areas in the airway is shown in table 1.

In six patients (85.7%) the obstruction ranged between 50 to 70 % of the lumen of the subglottis and in one case (14.2%) the obstruction was <50% (table 1).

All of the infants were kept in the pediatric intensive care unit for least 24 hours postoperatively for observation, and one of them was intubated for 24 hours.

All of the infants were started on intravenous dexamethasone immediately after bronchoscopy for 3 days, then high daily dose of prednisone orally for 10 days, then low dose alternate every other day. The duration of of steroid treatment in our series ranged between 6 and 18 months with an average of 12 months (table 1). Case number 7 is still under treatment.

There were no major complications related to steroid therapy, one patient (14.2%) developed cushingoid face because of long term treatment with steroid (18 months) (case 4). The patient's face reversed to its normal feature after cessation of steroid therapy.

All of our patients were followed for a period of at least 2 years post cessation of symptoms and steroid, except for one case still under treatment (case 7). All of our cases who completed the corticosteroid treatment course improved completely. There was no effect on growth of the children as all of them were followed up with a growth chart.

Discussion:

The diagnosis of CSH is considered in infants and children with symptoms of upper airway obstruction or croupy like cough, particularly in infants under 6 months of age.⁸ The finding of cutaneous hemangioma in a child with respiratory symptoms should increase the suspicion of CSH, synchronous hemangioma was found in all of our cases. Eighty five (85.7%) of our cases presented by the age of 4 months or younger, only one case was 7 months old. Gender distribution of 6:1 (F: M) in our cases is higher than the ratio reported by other investigators of 2:1.¹¹

The location of CSH in our study population in the posterior wall of the subglottic region is in agreement with that reported previously.¹² The degree of airway narrowing ranged from 40 to 70% of the subglottic lumen with the majority of lesions causing 50% obstruction or greater, similar findings were seen in previous studies.¹³

A number of management strategies are described in the literature. These include tracheotomy and waiting for spontaneous regression. However, tracheotomy in pediatrics may be associated with increased morbidity and mortality.¹⁰

Sclerotherapy and cryotherapy have been advocated before, but both have limited success rate,⁸ in addition the injection of sclerotic agents has the potential risks of stenosis, hemorrhage and tracheobronchitis.¹⁴ Internal and /or external radiation therapy has been used before but this method was abandoned due to the concerns of inducing malignant neck and thyroid tumors.¹⁵ However, Benjamin and Carter noticed that the possibility of radiation induced malignancy in the thyroid is reduced to a minimum by the use of radioactive gold grain for localized tumor.¹⁶

Interferon alfa 2a has been found to be useful in the treatment of life threatening hemangioma refractory to other forms of therapy. This agent is thought to function due to its antiangiogenic properties. Possible complication includes fever, superficial skin loss, elevated liver enzymes and neutropenia.⁶

Open surgical excision through midline cricotracheotomy with open resection was proposed for large hemangioma that requires tracheotomy and for extensive lesions that carry a high risk of stenosis if treated with laser.¹⁷ However, the most common modalities currently in use are steroid therapy and CO2 laser excision.

Excision of CSH using the CO2 laser was first described by Healy et al,¹⁸ it has several advantages, including the absence of bleeding during surgery and avoidance of the potential adverse effect of prolonged intubations, steroid therapy, and tracheotomy.¹⁹ However, the risk of breaking the mucosal integrity and the development of subglottic stenosis is still present.^{8,20}

Steroid therapy is the other common modality of treatment that can be used either systemically or locally.^{11,21} Meeuwis et al, have successfully treated their patients with intralesional injection of steroid and intubations.¹⁰ This modality is not commonly used compared to systemic steroid therapy.

In our institution we used systemic corticosteroids as the primary modality of treatment in symptomatic CSH. All of the symptoms of our cases (100%) were effectively controlled with this therapy. The duration for steroid therapy ranged from 6 to 18 months with a mean of 12 months.

Systemic corticosteroid is shown in previous studies to be an effective treatment for CSH.^{12,21}

The mechanism of action of steroid on hemangiomas is controversial,¹⁵ steroid increase the sensitivity of blood vessels to the endogenous circulation vasoconstrictors, which hasten the involution of the hemangioma.²¹ It was postulated that hemangioma tissue has estradiol receptors; thus, steroid may occupy these receptors and block the uptake of estradiol, which may have supportive function on hemangioma.²²

In conclusion; CSH is an uncommon congenital anomaly that may result in an airway obstruction. Systemic corticosteroids can be one of the treatment options that may result in overcoming the distressing airway presentation of CSH. Careful monitoring and small dose with an alternating days course of systemic corticosteroids may reduce the possibility of complications as well as avoid the possibility of growth retardation.

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Patient NO.	Age/ sex	Presentation	Site of involvement	Percentage of obstruction	Duration of steroid use	Complications
1	3 mon/ M	Stridor, RD, FD	Post. SG	40%	6 mon.	
2	1 mon / F	Stridor, RD, recurrent croup, cyanosis, FD	RT Post. SG	70%	12 mon.	
3	2 mon / F	Stridor, RD, FD	LT Post. SG	60%	14 mon.	
4	7 mon / F	Stridor, RD	RT Post. SG	50%	18 mon.	Cushingoid face
5	2 mon / F	Stridor, RD	Glottic, post. SG, trachea	50%	12 mon.	
6	4 mon / F	Stridor, RD	Post. SG	70%	12 mon	
7	4 mon / F	Stridor, RD, recurrent croup, cyanosis, FD	Circumferential	70%	Still under treatment	

Table 1; shows age, sex, presentation, site of CSH, percentage of subglottic obstruction, duration of steroid treatment and complications. Mon.= months, M=male, F=female, RD =respiratory difficulty, FD=feeding difficulty, RT=right, LT=left, SG=subglottic.