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## A Review of Common Pediatric Lip Lesions: Herpes Simplex/Recurrent Herpes Labialis, Impetigo, Mucoceles, and Hemangiomas

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**Summary:** Lip lesions are a common presentation to the pediatrician's office. These lesions are often benign in children, without significant functional morbidity. However, owing to the prominent placement of lips and their role in communication, lip lesions can be alarming to patients as well as to their parents. For these reasons the pediatrician has an important role in recognizing, diagnosing, and treating the various types of labial dermatoses that commonly present to a pediatric practice. Four of the most common lip lesions a pediatrician will see are herpes simplex/recurrent herpes labialis, impetigo, mucoceles, and hemangiomas. This paper reviews the current literature on the diagnosis, treatment, and management of these 4 lesions. *Clin Pediatr.* 2003;42:475-482

#### Introduction

ips provide entrance to the oral cavity and are prominently placed in the center of the face. They help manipulate ingested food into the oral cavity, are involved with speech articulation and communication, reflect sexuality, and are important identifying facial features. Any abnormality or blemish is easily noticeable and a potential source of embarrassment. Diagnosis and treatment of lip abnormalities is important, not only to prevent disease morbidity and mortality, but also to restore social acceptance and self-esteem.

During the 7th week of intrauterine life the lips start to develop; by the 9th week, they are fully developed. The upper lip is the result of fusion of the medial nasal prominences and maxillary prominence. The lower lip comes from the mandibular prominence of the first branchial arch with the upper.<sup>1</sup>

The upper lip has the shape of a "Cupid's bow," while the lower

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lip is semi-elliptical. At the commissure, the lips meet laterally. Each lip is attached to the adjacent alveolus by the frenulum. The orbicularis oris muscle circles both lips. A number of other muscles interdigitate with this muscle and move the lips in other directions. The 7th cranial nerve innervates these muscles. The mandibular branch of the 5th cranial nerve supplies the sensory innervation. Lips are highly vascularized and hairless. The vascular supply is from the labial branches of the facial artery.

Lips have a "wet" internal mucosa and "dry" external mucosa. The junction appears as a "white line." The mucosa has a number of labial glands. Unlike other areas of the body covered by skin, the external mucosa lacks the tough keratin covering, has a thinner epithelium, less melanin, and lacks sebaceous and sweat glands, all of which have a protective function. These characteristics cause the lips to be more susceptible to damage from the elements, environment, trauma, and infection.

A comprehensive English language literature search of MED-LINE from 1966 to 2002 was performed. Initially, the following MeSH terms were used: "lips," "pediatrics," and "prevalence," to establish 4 of the most common lesions. An informal survey of primary care physicians in Edmonton, Alberta, Canada, was also performed to identify which lesions were most commonly seen clinically, and these results further reinforced the MEDLINE search. Following the determination of common pediatric lip lesions, the term "pediatrics," along with "recurrent herpes labialis," "impetigo," "mucocele," or "hemangioma" were searched. The majority of the papers included in this review were current randomized, controlled trials, prospective or retrospective population-based studies, case reports, and reviews. This paper reviews 4 common pediatric lip lesions: herpes simplex/recurrent herpes labialis, impetigo, mucoceles, and hemangiomas.

#### Herpes Simplex/ Recurrent Herpes Labialis

The herpes simplex viruses are responsible for a large number of cutaneous infections in humans. There are 2 types of herpes infections recognized clinically: primary and recurrent. The primary infection is often missed as it commonly occurs during adolescence and may be asympto-

matic. An infected mother can transmit viral particles to her fetus vertically during delivery, due to asymptomatic cervical shedding. The ensuing neonatal infection is difficult to diagnose clinically as the symptoms are very nonspecific and may not be recognized. It has been shown that mothers who experience a primary genital herpes simplex virus (HSV)-infection in the third trimester of their pregnancy, who are seronegative at delivery, have a 33–50% chance of transmitting the virus to their infant.<sup>2</sup> Conversely, secondary reactivation of HSV in a seropositive woman during the intrapartum period incurs a 3% risk of vertical transmission to her infant.<sup>2</sup>

Herpes simplex virus type 1 (HSV-1) classically causes the "above the waist" lesions, including the oral and perioral lesions, and keratoconjunctivitis.<sup>3</sup> It is thus implicated in most cases of recurrent herpes labialis, while HSV-2 is responsible in 10% to 15% of recurrent oral ulcerations.<sup>4</sup> Ninety percent of the US population is seropositive for HSV-1 by the time they reach their teenage years, with at least 90% of these patients seroconverting by age 5 years.<sup>5,6</sup> Similarly, a British study in 1999 reported a prevalence of almost 100% seroconversion by the age of 15 years.<sup>7</sup> It has been estimated that up to 40% of seropositive individuals develop recrudescent disease, resulting in site-specific, recurrent ulcerations such as herpes labialis, or "cold sores."<sup>8</sup>

On initial infection, oral herpes classically presents as a gingivostomatitis, affecting the oral mucosa with small vesicles that rapidly break open releasing a yellowish exudates (Figure 1). The vesicles are replaced by painful ulcerations, along with edematous, punched-out lesions of the gingival margin. Primary oral herpes infection can occur on the inner mucosal border of the lips, but the pathognomonic "cold sore," which manifests extraorally on the vermilion border of the lip, is a recurrent herpes simplex infection, or "herpes labialis." It occurs following reactivation of latent herpes virus in the cells of the trigeminal ganglia.

Unlike the primary gingivostomatitis, recurrent herpes labi-



Figure 1. Primary herpes simplex gingivostomatitis.

alis is much milder in its manifestation, without the systemic symptoms. A tingling, burning, or itchfeeling may ing occur prodromally at the site of the impending lesions, 12-36 hours before eruption.<sup>4</sup> Classically, a single, well-localized cluster of 3-5 vesicles appears containing the virus.9 With recruitment of inflammatory cells the vesicles ulcerate and crusting occurs within the first 24-48 hours after appearance of the initial lesions.<sup>4</sup> It is at the time of vesicular rupture that lesions are most contagious9 and the lesions remain contagious until healed. In order for transmission of HSV to occur between a seronegative and a seropositive individual, shed virus must come into direct contact with mucosal surfaces or abraded skin on the susceptible individual. Transmission between a seropositive and a seronegative individual can still occur even without the presence of active lesions. One study of otherwise healthy adults in Japan found that active shedding of HSV-1 into saliva occurred and persisted on average 1.2 days over the course of 2 months, without symptomatic lesions.<sup>10</sup> There was no demonstrable causative link to the shedding in these subjects.<sup>10</sup> Recurrences of herpes labialis in affected individuals typically occur 2 or 3 times a year, with ultraviolet (UV) light, trauma, and physical and emotional stress serving as possible triggers.<sup>4,11</sup> Vesicles usually heal in 8 to 10 days in immunocompetent people, without leaving a scar.11

The diagnosis of recurrent herpes labialis is clinical, owing to the classic presentation of the lesions and lack of constitutional symptoms. Following diagnosis, early treatment of erupted recurrent lesions is of questionable benefit in children and is up to the physician's discretion.<sup>12</sup> To date, no studies directed at the benefits of acute treatment of such lesions have been completed in the pediatric population. However, if the decision to treat an acute eruption is made, first line treatment is generally an oral antiviral medication such as acyclovir. In children less than 12 years of age, the recommended dose of oral acyclovir is 20 mg/kg every 8 hours.<sup>12</sup> In postpubertal children (>12 years old), adult dosing schedules can be followed.12 Besides acyclovir, famiclovir and valacyclovir have also been found to be efficacious in adult patients. In adult patients, Spruance et al<sup>13</sup> showed that once the lesions of herpes labialis have erupted, early treatment with high-dose famciclovir (250 mg 3 times per day for 5 days) decreases the size and duration of the lesions. Similarly, a doubleblind study of 3,151 patients with cold sores showed a reduction in the duration of the eruption by 1.3 days in the group using 2 g of valacyclovir twice daily for 1 day.14 Another group in this same study had a lesion-time reduction of 1.2 days after receiving 2 g of valacyclovir twice daily for 1 day, then 1 day of 1 g valacyclovir twice daily.14 Approximately half of the 3,151 patients in this study were prevented from progressing to the macular/papular stage of the herpes eruption following administration of the valacyclovir.14

Besides oral antiviral treatment, some benefit has been shown following topical administration of acyclovir, but only for primary infection. This method is slightly less efficacious than oral formulations owing to the primarily neural nature of HSV infections and less opportunity for the topical treatment to exert its effects.<sup>15</sup> Again, no studies have been performed in children at this point. Application of topical 1% penciclovir cream every 2 hours when awake for 4 days was shown to decrease the duration of healing (1-day reduction in healing time as compared to vehicle), pain, and viral shedding in adult patients.<sup>16</sup>

Controlled studies have been performed in adults showing that prophylactic treatment for herpes labialis is beneficial using oral acyclovir or famciclovir.12,17,18 Adult studies show that short-term prophylactic therapy is warranted in some situations such as when the affected individual experiences episodes of herpes labialis monthly, or if the individual is anticipating an unavoidable known trigger, or if the patient experiences erythema multiforme following herpes labialis attacks.<sup>17,18</sup> Prophylactic doses of oral acyclovir 400 to 1,000 mg per day were recommended, taken at the time of exposure to known triggers.<sup>17,18</sup> In children prophylaxis is rarely indicated and again, the decision to treat is up to the pediatrician's discretion.

## Impetigo

Impetigo is a contagious bacterial infection of the superficial layers of the epidermis, often occurring periorally. There are 3 clinical presentations, all of which are most often observed in the pediatric population: impetigo contagiosa (nonbullous), bullous impetigo, and common impetigo.<sup>19</sup> Impetigo contagiosa is the most common skin infection in children,19 especially between the ages of 2 to 5 years old.20 Bullous impetigo is usually an infection of neonates and more commonly occurs on the trunk and the extremities.<sup>19</sup> Common impetigo occurs

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in adults as a complication of dermatological conditions causing a break in the skin or systemic diseases such as diabetes mellitus and acquired immunodeficiency syndrome (AIDS).<sup>19</sup>

Impetigo contagiosa and common impetigo present initially as a single 2 to 4 mm erythematous macule that rapidly turns into a vesicle or a pustule. The vesicles rupture and a "honey-colored" crusted exudate remains. Spread to adjacent skin occurs rapidly as the lesions extend and coalesce, producing eroded macules in patches (Figure 2). It has been speculated that the site preference for impetigo eruption in the perioral and nare areas is due to their high exposure to environmental trauma.<sup>19</sup> Insect bites, contact dermatitis, or minor abrasions are often found demonstrating the portal of entry for the bacteria. Secondary infection with impetigo in children suffering from atopic dermatitis often results in rapid spread of the lesions to other cutaneous sites, owing in part to the compromised nature of their skin barrier, 19,21 depressed cutaneous immune function,<sup>21</sup> and a lack of normal-flora lipophilic bacteria.<sup>21</sup> More aggressive treatment is warranted in these instances.

There are 2 pathogens implicated in impetigo, *Staphylococcus aureus* and *Streptococcus pyogenes*.<sup>20</sup> In the past, most cases of impetigo contagiosa were caused by *S. pyogenes*; however, more recent studies have shown that *S. aureus* is now the organism most frequently cultured from lesions.<sup>22,23</sup> Mixed *Staphylococcus* and *Streptococcus* infections are common as well. Penicillin and ampicillin resistance have been shown in most *Staphylococcus* infections of this mixed nature.<sup>22,23</sup>

Cultures of impetigo are necessary only when treatment has failed and methicillin-resistant *Staphylococcus aureus* is suspected.

In localized cases, topical treatment with fusidic acid or 2% mupirocin applied 3 times daily for 7 to 10 days<sup>24</sup> is sufficient. Removal of crusts before application is controversial. Emerging resistance to mupirocin has been noted with *S. aureus*, especially in cases of prolonged use, warranting judicious use of this antibi-

otic.<sup>25</sup> Cloxacillin (40–50 mg/kg/ day, q.i.d.) or cephalexin (40 mg/kg/day, q.i.d.) is used as oral therapy for 7 days in generalized cases.<sup>26</sup> Erythromycin is no longer the treatment of choice owing to emerging resistance.<sup>20</sup> Lesions should resolve without scarring. If the impetigo does not resolve after a 7- to 10-day course of antibiotics, it is important to test for nasopharyngeal carriage of S. aureus.24 Elimination of the carrier state can be accomplished empirically by application of mupirocin, until the infection clears.24

One important complication of impetigo caused by *S. pyogenes* is acute poststreptococcal glomerulonephritis. This occurs in approximately 2-5% of cases of streptococcal impetigo, most commonly in children 2 to 4 years old.<sup>20</sup> Antibiotic treatment of the infection does not alter the course of this form of glomerulonephritis. Fortunately, there is usually resolution without sequelae in children.<sup>20</sup>

#### Mucoceles

Mucoceles are common mucous membrane lesions associated with minor or accessory salivary glands. There are 2 types of mucoceles: mucous extravasation cysts and mucous retention cysts.<sup>27,28</sup> Mucous extravasation cysts are the most common and are found in children and adolescents, most commonly in the 2nd decade of life.27,29 These lesions are much more likely to occur on the lower lip, with 1 study reporting a site predilection for the lower lip of 58% over all other oral mucous membranes.<sup>30</sup> Mucous retention cysts are less common, with an incidence of approximately 3% of mucoceles.29



Figure 2. Impetigo.

Mucoceles of the extravasation type are caused by trauma that shears a minor or accessory salivary gland duct. This results in saliva accumulating between the epithelium and the adjacent soft tissue. A pseudocapsule of fibrous connective tissue forms, walling off the mucocele. Extravasated mucoceles are not true cysts, for they do not have an epithelial lining.<sup>28</sup>

Mucoceles will most often present opposite the upper incisor on the lower lip as painless, smooth, freely movable, soft, fluctuant masses, measuring on average approximately 1 cm (Figure 3).<sup>31</sup> They can be found on the upper lip as well. Mucoceles on the lower lip are often bitten by the patient, and consequently they drain and heal; however, the swelling eventually recurs.<sup>31</sup> The more superficial lesions can have a bluish tinge, while deeper mucoceles are more likely to be the color of normal mucosa.<sup>27</sup> The fluid-filled nature of the deeper mucoceles is less obvious.

The diagnosis of mucoceles is made clinically, with the patient describing some traumatic event to the lip. The appearance of these lesions is pathognomonic, and palpation helps to confirm the freely movable, soft nature of mucoceles.<sup>27</sup> Biopsy is unnecessary but would confirm the diagnosis.

Following diagnosis, treatment is often not needed as the smaller and more superficial mucoceles are likely to rupture spontaneously and then heal.<sup>27</sup> The most common treatment of larger or recurrent mucoceles is surgical excision, with subsequent removal of the associated salivary glands.<sup>32</sup> This helps to prevent recurrences. Prognosis of mucoceles is good, whether treatment is needed or not.

## Hemangiomas

Hemangiomas are vascular anomalies cited as the most common benign, neoplastic lesions in infants. They are noted most commonly on the head and neck (50-60%), and this site preference is most likely due to the underlying intricate vasculature of this region.<sup>33,34</sup> They are a frequent cause of presentation to the pediatrician since hemangiomas



Figure 3. Mucocele on the lower lip (photo courtesy of Dr. Wysocki).

develop in 2.6% of neonates, with the prevalence increasing to 10% by 12 months of age.<sup>35,36</sup> Females are most often affected, with reported rates 2 to 5 times greater than males.<sup>37</sup> Prematurity and low birth weight (500 to 1,000 g) are associated with the development of these lesions as well, with a 1.5 to 2 times greater occurrence rate than in normal infants.<sup>37</sup> Infants weighing 1,500 g or more at birth have the same incidence as regular birth weight babies.<sup>37</sup>

There are 2 types of hemangiomas, defined by the depth of their penetration into the dermis.<sup>34</sup> The superficial lesions are bright red, blanchable nodules with well-defined borders, and these comprise approximately 65% of all hemangiomas.<sup>34</sup> Deep lesions represent 15% of these vascular anomalies, and they appear as bluish nodules with less distinct borders.<sup>34</sup> The remaining 20% are considered 'mixed' and present as a combination of superficial and deep lesions.34 An example of a superficial (strawberry) hemangioma is shown in Figure 4.

There are typically 5 stages in the development of hemangiomas including eruption, proliferation, plateau, involution, and regression. At approximately 2 to 4 weeks of age the nodules erupt, appearing either red in color with telangiectasia, or hypopigmented.33 From approximately 6 to 12 months, the endothelial cells proliferate, with the hemangioma reaching a maximal size at around 12 months of age.<sup>34</sup> A plateau is reached and the lesion remains stationary from roughly 12 to 15 months of age.33,34 Approximately 50% will involute and regress by age 5 years, 70% by age 7 years, and 90% by age 9 years.34 Residual atrophic or redundant skin may follow involution and regression.

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Figure 4. Strawberry hemangioma on the upper lip.

Superficial hemangiomas are composed of blood vessels resembling capillaries, with thin walls and a thin endothelium lining, while the deep variant of hemangiomas results from dilatation of vascular channels at a deeper level.<sup>38</sup>

The diagnosis of hemangiomas is clinical, with distressed parents presenting to their pediatricians with infants in the early stages of lesion development. Ninety percent of hemangiomas are diagnosed in the 1st month of life.<sup>34</sup> Parents will often express feelings of guilt, shame, disbelief, mourning, and anxiety.<sup>39</sup> Support and reassurance must be given at the time of diagnosis.

As a result of the psychosocial stressors of hemangiomas and the high rate of spontaneous involution, education, reassurance, and monitoring are the mainstays of treatment. It is useful to show parents photos of before and after lesions following spontaneous involution, and a wait-and-see approach is often best. Decisions to treat are based on prevention of loss of life or function, and the possibility of scarring. The majority of hemangiomas are small and superficial. However, some may grow rapidly and impinge on organ systems, resulting in lifethreatening complications. In particular, hemangiomas of the head and neck are worrisome if they have the potential to obstruct the infant's airway or impair vision at a crucial time in the development of visual pathways. If the decision is made to treat the hemangioma, options include systemic corticosteroids (prednisone 2-4 mg/kg/day for 2-3 weeks) for rapidly growing, life threatening, or functionally impairing lesions.<sup>34</sup> The rate of response to prednisone is 30% to 90% and is expected within 7 to 10 days of initiating treatment; a good response is characterized by a fading of the color or slowed growth, as well as softening of the hemangioma.34 Intralesional injection of corticosteroids can also be safe and effective in properly selected infants with hemangiomas.<sup>40,41</sup> If the hemangioma is unresponsive to corticosteroids, therapy with subcutaneous interferon alpha-2a is the next line of treatment.<sup>42</sup> A 50% regression

rate has been reported in infants treated with this method.42 However, interferon alpha-2a has a mean time to regression of 7 months and requires monthly complete blood counts, as well as hepatic and renal function tests.<sup>42</sup> Laser therapy and surgical treatment are also possibilities if deemed necessary to remove the lesion, with a  $60\%^{43}$ response rate of superficial strawberry hemangiomas to fastpulsed dye laser (FPDL).<sup>34</sup> This laser can also be used to remove residual telangiectasias after regression of a hemangioma.34 Surgical excision is the treatment of choice in lesions extending to involve the eyes, which are unresponsive to corticosteroids, and is also useful in removal of redundant skin after spontaneous involution of hemangiomas.44

The prognosis is good with superficial hemangiomas as most spontaneously involute and regress with minimal residual atrophy. The outcome is worse with deep or mixed hemangiomas as the likelihood of incomplete involution, with residual redundant skin that is wrinkled and telangiectatic in appearance is greater. Restoration of normal skin following spontaneous regression occurs in only 50% of cases.45 If residual skin with telangiectasia remains, laser or surgical treatment is appropriate and the final result is more cosmetically pleasing.34

Table 1 summarizes the current treatment options for recurrent herpes labialis, impetigo, mucoceles, and hemangiomas.

## Conclusion

Lip lesions are a common presentation to the pediatrician's office, often necessitating consultation. In children, most lesions are

## Common Pediatric Lip Lesions

#### Table 1

#### SUMMARY OF TREATMENT OPTIONS FOR PEDIATRIC LIP LESIONS

Lip Lesion	Treatment Options
Recurrent herpes labialis	<ul> <li>at pediatrician's discretion</li> <li>&lt;12 years old oral acyclovir 20 mg/kg q8h<sup>12</sup></li> <li>&gt;12 years old (postpubertal)→</li> <li>Use adult dosing schedules<sup>12</sup></li> </ul>
	Prophylaxis: oral acyclovir 400–1,000 mg q.i.d. started at the time of exposure to known trigger <sup>17,18</sup> Early treatment of erupted lesions: oral famciclovir 250 mg t.i.d. for 5 days <sup>13</sup> valacyclovir 2 gm b.i.d. for 1 day or 1% penciclovir cream q2h for 4 days <sup>16</sup>
Impetigo	<ul> <li>swabs for C&amp;S before commencing treatment</li> <li>uncomplicated → crust removal and application of fusidic acid or 2% mupirocin for 7–10 days t.i.d.<sup>24</sup></li> <li>complicated → cloxacillin 40–50 mg/kg/day q.i.d. or cephalexin 40 mg/kg/day q.i.d., for 7 days<sup>26</sup></li> </ul>
Mucoceles	<ul> <li>usually no treatment required</li> <li>if large/recurrent → surgical excision<sup>32</sup></li> </ul>
Hemangiomas	<ul> <li>most spontaneously involute</li> <li>psychosocial support and close follow-up</li> <li>if necessary to treat, consider referral to dermatologist: 1. prednisone 2–4 mg/kg/day for 2–3 weeks; expect response in 7–10 days;<sup>34</sup></li> <li>2. intralesional steroids;<sup>40,41</sup> 3. interferon alpha-2a subcutaneously;<sup>42</sup> 4. laser therapy;<sup>34</sup></li> <li>5. surgical excision<sup>34</sup></li> </ul>

benign and should not cause significant morbidity. Treatment is often conservative, with reassurance being paramount. For these reasons it is necessary to be able to recognize, diagnose, and treat the various types of labial dermatoses that commonly present to a pediatric practice.

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