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Original Research

Case Studies

Perceptions of Child Weight Status by Parents of Children on Medicaid

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Abstract

Background: Parental perception of child's size has been evaluated in previous studies, but the degree of inaccuracy has been overlooked. In addition, parents of children on Medicaid may be more likely to have inaccurate perception of their child's size. The objectives of this study were to assess the rate of overweight children, document the degree of discrepancy between parents' perceptions and their children's actual weight status, and identify factors related to inaccurate parental perception in a population predominantly insured by Medicaid.

Methods: Participants in the cross-sectional survey included 241 parents of children age three to 12 years, who were English or Spanish speaking, and at least 18 years of age. Surveys asked parents to identify their child's size based on a 5-point likert-type scale.

Results: A Body Mass Index (BMI) at the 95th percentile or above was found for 30.3% of children. Parents were only correct 39.8% of the time when describing their child's weight status. In fact, 39.4% underestimated their child's weight by one BMI category, 17.4% by 2 categories, and 1.7% by 3 categories. Parental accuracy decreased as child's weight status increased. No other measured characteristics significantly impacted parental accuracy.

Conclusions: Children on Medicaid have high levels of overweight and nearly 20% of parents underestimated their child's size by at least 2 BMI categories. Parental perception needs improvement before interventions are likely to be effective. *KJM 2009; 2(4):78-86.*

Introduction

One of the major health concerns facing children today is the rising epidemic of obesity. Overweight children face a plethora of physical issues that can affect them for the rest of their lives,[1,2] including type 2 diabetes, hypertension, dyslipidemia, hepatic steatosis, cholelithiasis, sleep apnea, menstrual abnormalities, impaired balance, and orthopedic problems.[2] In addition, a social stigma is associated with larger body mass that may result in teasing, stereotyping, discrimination, and social marginalization.[2,3] These social issues may increase depression and anxiety, while decreasing esteem[2] and perceived cognitive and physical ability,[4] further impairing overall quality of life.

Institutions such as government, public health programs, and school systems, as well as individual health care workers continue to combat the growing prevalence of childhood obesity, but parent's involvement is instrumental in helping children stay healthy. Children whose mothers perceived them as overweight as infants or toddlers lost more weight by the time they were seven than children whose mothers perceived them as just right or underweight.[5] Also, parents were more likely to actively address their child's excess weight if they perceive their child's weight as a health problem.

Studies in the United States[6-12], Australia[13,14], Argentina[15], Canada[16], Germany[5], Italy[17], New Zealand[18], and the United Kingdom[19,20] have assessed parents' perceptions of their child's weight and found between 38%[5] and 94%[19] of parents were unable to assess their child's weight

accurately. Several predictors of accuracy have been identified, including child's age[1,5,11,14], gender[11,16,20], ethnicity[16], and Body Mass Index (BMI)[7,18,19].

While many studies have looked at predictors of inaccuracy, few have measured the degree of inaccuracy. It can be extrapolated from Eckstein et al.[6] that 2% of respondents whose children were a little overweight to overweight classified their child as underweight to a little underweight. Miller and colleagues[18] found that 6% of parents under-classified their child's weight by two BMI categories. However, neither of these studies actually examined how far off parental perception was from reality. The only identified study that looked at degree of inaccuracy based the comparison on a visual analog scale of measurement.[7] If the child's actual BMI was greater than or equal to the 95th percentile, 89.5% of parents were inaccurate by 30 percentage points or more, suggesting at least a two category discrepancy. However the visual analog scale only included the anchors of "Extremely underweight" and "Extremely overweight" so parents may not have been aware of which category their response would fall.

Degree of inaccuracy is an important component in understanding parental perception of child weight and additional research is warranted. Greater variance between parental perception and actual child size may indicate a need for a paradigm shift to improve parental understanding of child weight issues. Helping parents accurately understand their child's size may improve adherence to and efficacy of interventions to decrease child weight and improve health. However, before parental inaccuracy can be addressed, the degree to which parents misidentify their child's size must be understood.

Parents of children who receive Medicaid may be at increased risk for inaccurate perception of child weight. Children with Medicaid or no insurance have greater morbidity and mortality than children on private health insurance[21] and are more likely to be diagnosed overweight.[22] In addition, children on Medicaid exhibit lower literacy levels than the general population and may have more difficulty understanding health-related materials.[23]

In previous studies, maternal perception of child weight was assessed in an urban Women, Infants and Children (WIC) program[8] and in a Head Start program[9]. Both populations often rely on Medicaid for their health care needs,[24,25] however, both studies were limited to Hispanic populations. Wald et al.[10] looked at parental perceptions in a pediatric primary care setting, but only a third utilized Medical Assistance. Further investigation is needed to determine accuracy of parental perception of weight status in a Medicaid population.

The purpose of this study was to assess the rate of overweight children, the level of discrepancy between parents' perceptions and their children's actual weight status, and factors related to inaccurate parental perception in a population predominantly insured by Medicaid.

Methods

Data instrument. A one page, multiple-choice survey was developed regarding health and safety of children. The primary question of interest addressed parental perception of child's weight status. Previous studies used several methods to assess parental perception of weight including a visual analog scale[7], pictures of children[9], drawings of children[6], yes/no questions[8,11], and four-point likert-type questions[10,15,18]. However, the most commonly used format involved a five-point likert-type question[5,6,12,14,16,17,19,20,26,27] which was chosen for this study. Response options

included: "too skinny", "thin", "just right", "somewhat overweight", and "overweight".

The secondary set of questions included topics such as nutritional habits (servings of fruit and vegetables, frequency of fast food use), helmet use, hours of television viewed, hours of sleep per night, time spent in exercise, neighborhood safety, and proximity to closest park. These questions were included to allow parents to answer the survey without bias towards weight issues.[7,28]

The survey was available in English and Spanish and written below the 6th grade language level, as recommended for comprehension in at-risk populations.[29] Surveys were collected from March to August of 2007. Institutional Review Board approval was obtained from the medical school and the hospital where the ambulatory pediatric services were provided.

Data collection. Parents had to be English or Spanish speaking, at least 18 years old, and the parent of a child age three to 12 years with an appointment at the Wesley Pediatrics Clinic (WPC). WPC provides services to many of the underserved children in Sedgwick County. Approximately 95% of patients at WPC have Medicaid benefits. Physicians staffing the clinic were pediatric and internal medicine/pediatric residents working under the supervision of pediatric faculty from the University of Kansas School of Medicine-Wichita.

The survey was distributed to parents upon arrival for their child's scheduled appointment. An information sheet attached to the survey explained the study goals and consent for responses to be used for research purposes was implied by survey completion. Parents were blinded to the exact topic of study to avoid bias. Surveys were completed in the waiting room and given to the child's nurse when the patient was called to an exam room. Patients were included in the study regardless of the reason for seeking medical care.

WPC staff performed routine height and weight measures per clinic procedures. Physical measurements were collected the same day the survey was completed. Following weight and height measurement, WPC staff placed the survey in a closed collection box.

Variables and definitions. Body Mass Index (BMI) was calculated for the patients by taking the weight in kilograms divided by the square of height in meters (kg/m^2). Patient BMI results were classified into groups as follows: underweight (BMI less than 5th percentile), normal (BMI 6th through 84th percentile), at risk of overweight (AROW; BMI 85th through 94th percentile), overweight (BMI 95th percentile and above). Growth charts used to identify BMI percentiles were the May 2000 revised charts by the National Center for Health Statistics (NCHS).[30]

Due to low response rates in the categories of "too skinny" and "thin", parent perceptions of children's weight were truncated from a five-point scale to a four-point scale concurrent with the BMI categories reported above. The categories "too skinny" and "thin" were combined to form an underweight group, "just right" became the normal group, "somewhat overweight" became the AROW group, and "overweight" remained the overweight group.

Data analyses. Analyses were conducted using SPSS 15.0 for Windows.[31] Frequencies, means, and standard deviations were computed for demographic information, while chi-square statistics were computed for categorical and ordinal data. An independent t-test was run to determine the effect of the continuous variable of child age on parental accuracy.

Results

Participants. A total of 290 surveys were collected. Only 241, however, included the information necessary to study parent perception of child's weight status, child's weight, and height. Children were age three to 12 years with an average age of 6.38 (SD = 2.781). Slightly more male (122; 50.6%) than female children were evaluated. Equal numbers of participants (31%) were Hispanic or African American; 21% were white, 8% "other", and the remaining 8% chose not to identify their ethnicity. The majority of surveys completed were in English (83.4%).

BMI. The rate of overweight children (BMI 95th percentile or above) at the WPC was 30.3% and the highest percentage of overweight children were African-American (Table 1). However, chi-square analysis found no significant difference between ethnic/racial groups ($\chi^2(9) = 9.082$, $p = 0.430$). Similar distributions of BMI were found based on gender; again, no significant difference was found ($\chi^2(3) = .991$, $p = 0.803$).

Table 1. Percent (and number) of children in each BMI group by race and gender.

	All*	White	African-American	Hispanic	Other	Male	Female
Less than normal	3.3% (8)	5.9% (3)	4.0% (3)	2.7% (2)	0.0% (0)	3.3% (4)	3.4% (4)
Normal	55.2% (133)	62.7% (32)	52.0% (39)	54.7% (41)	35.0% (7)	56.6% (69)	53.8% (64)
AROW	11.2% (27)	5.9% (3)	10.7% (8)	14.7% (11)	15.0% (3)	12.3% (15)	10.1% (12)
Overweight	30.3% (73)	25.5% (13)	33.3% (25)	28.0% (21)	50.0% (10)	27.9% (34)	32.8% (39)

* Numbers missing from the total indicate missing data.

Parental perception. Parents of pediatric patients at WPC were only correct 39.8% of the time when describing perception of their child's weight status (Table 2). In fact, 39.4% underestimated their child's weight by one BMI category, 17.5% underestimated by two categories, and 1.7% underestimated by three categories; in contrast, only 1.6% overestimated by one category.

To determine whether differences existed in perception based on child characteristics, chi-square analyses were run to compare parental accuracy to child's race, gender, and BMI group, respectively. To avoid expected cell counts less than five, race was limited to Hispanic, white, and African-American. The results by race were not significant ($\chi^2(2) = 5.483$, $p = 0.064$). Gender also did not significantly affect accuracy ($\chi^2(1) = 0.467$, $p = 0.494$). However, a comparison of normal, AROW, and overweight children found that BMI group was significantly related to parental accuracy ($\chi^2(2) = 66.527$, $p < 0.001$).

Table 2. Percent (and number) of children in each BMI group compared to the parents' perceived BMI group.

	BMI	Underweight	Normal	Overweight	Obese	Total Children
Perceived Parent BMI	**Underweight**	2.1% (5)	20.7% (50)	1.7% (4)	1.7% (4)	26.1% (63)
	Normal	1.2% (3)	34.0% (82)	8.7% (21)	15.8% (38)	59.8% (144)
	Overweight	0.0% (0)	0.4% (1)	0.8% (2)	10.0% (24)	11.2% (27)
	Obese	0.0% (0)	0.0% (0)	0.0% (0)	2.9% (7)	2.9% (7)
	Total Children	3.3% (8)	55.2% (133)	11.2% (27)	30.3% (73)	100% (241)

Parents of normal weight children appeared to be the most accurate with 61.7% (82/133) correctly classifying their child, while only 7.4% (2/27) of parents of AROW children, and 9.6% (7/73) of overweight children could classify their child accurately.

Finally, an independent t-test was computed to identify whether the child's age affected parental accuracy. No difference was found between the age of children whose parents accurately classified their weight (M = 6.50, SD = 0.286) and the age of children whose parents were inaccurate (M = 6.30, SD = 0.230; t(239) = 0.555, p = 0.579).

Discussion

BMI. In 2007, the prevalence of overweight was 14.0% for youths in Kansas and the highest rate belonged to Washington, D.C. at 22.8%.[32] For our sample, the rate of overweight was 30.3%, suggesting a much higher rate than the Kansas average and greatly exceeding the highest national rate.

Parental perception. Accuracy of parental perception for a sample of children on Medicaid was extremely poor at less than 40%, however, accuracy was not lower than previously published studies on more general populations. Parents were accurate in identifying their child's size 62% of the time if the child's BMI was below the 85th percentile, compared with an accuracy of only 9% when the child's BMI was greater than or equal to the 85th percentile. This supported previous research findings suggesting parents are less accurate as child's weight increases.[18,19] However, increased accuracy identifying normal weight children may be inflated due to the wider range of weights (6th to 84th percentile) found within this category.

In our study, we were interested in measuring not only the rate of inaccuracy, but also the degree of inaccuracy. We found nearly 2% of parents were inaccurate by three categories (identifying overweight children as underweight) and over 17% of parents were inaccurate by two categories (identifying overweight children as normal or AROW children as underweight). These rates are higher than those previously reported in the literature.[6,7,18] Degree of inaccuracy is important because the less able parents are to perceive their child's true size, the less likely they are to engage in or support interventions to decrease their child's weight. Contrary to previous findings

our study did not find significant differences in parental perception by gender or age.[1,5,14,16] One possible reason could be due to differences in children's ages included in the studies. However, differences in findings between our study and previously published studies may have more to do with the characteristics of the parents than the characteristics of the children.

Medicaid recipients throughout the United States tend to be poor, unemployed, and have low educational attainment.[23] Parents of overweight children with Medicaid may associate with other parents and children in the same socioeconomic group which could influence their perception of normal weight. Low income mothers' beliefs about overweight also appear to differ greatly from those of the medical and health care communities,[9,33] as growth charts, the most common tool for identifying overweight status, lack face validity for low-income parents.[33,34] Lower income parents also tend to characterize overweight by functional impairment and felt a child should not be labeled overweight unless mobility is compromised.[9,33]

The only other issue reported as cause for concern about overweight was if a child was being teased and suffering from low self-esteem as a result.[9,33] Dominant among low-income mothers' beliefs about their children's weight is that growth and weight are predestined, therefore, out of the mother's control.[33,35] Inaccurate parental beliefs about child weight may lead parents to disregard medical advice as irrelevant if the health professional fails to take into account the individual child and family when making suggestions for remedy.[20,27,33] However, parents are more likely to identify weight issues in their child if their doctor had addressed the child's weight.[27]

Addressing parental perception of child weight and the ramifications of excess weight is the first step in addressing childhood overweight. It is clear from the current literature that parents do not accurately perceive their child's weight. Nurses, pediatricians, and family physicians must bear the burden of informing and influencing parents of the importance of maintaining a healthy weight, not just in childhood, but throughout adulthood. As researchers, we must develop effective and culturally sensitive scripts for educating parents about their child's weight and the potential health outcomes.[8,16] The development of effective interventions also is imperative to decrease the growing problem of overweight in our children, including strategies for parents, schools, and public health workers. The results of the current study suggested that parents of children receiving Medicaid may be an ideal population to pilot interventions due to the higher levels of overweight, potential lower levels of literacy, and inaccurate parental perception of weight.

Limitations. There are several limitations to the current study. The cross-sectional design does not lend itself to identification of a cause and effect relationship, therefore, we cannot be sure that having AROW or overweight children causes participants to be less accurate in classifying their child's weight. Other factors, such as number of generations in the United States or denial may play a role in decreasing parents' ability to perceive accurately.

While the survey instrument was based on questions from previous studies and pretested with a small group of participants, it was not examined for test-retest reliability. Therefore, we cannot assume that parents would answer the same if the survey was given again. The survey also was missing key demographic questions regarding respondents (i.e., age, relationship to child) due to a copying error. Further, the survey

was administered at a single facility, which does not allow for generalization to other practices, settings, or populations.

The survey looked at general perceptions of weight and did not attempt to identify cognitive beliefs that might contribute to misperception of weight. Utilizing BMI as a classification tool may have affected results as it does not take into account muscle mass or bone density. Further, the use of arbitrary cut-offs for BMI ranges also may have affected results.

Conclusions. The identification of low rates of accurate parental perception of overweight in Medicaid insured children could help in the development of appropriate prevention strategies as well as treatment strategies for decreasing childhood overweight in this underserved population. When informed, many parents appear surprised to learn how overweight their child is compared to normal and do not identify tactics easily to improve their child's health. Pediatric healthcare providers need to develop successful communication strategies to inform families when their child is overweight and identify appropriate recourse to combat overweight. Future research should work to identify such strategies as well as determine parental characteristics related to inaccurate perception of child's weight.

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Keywords: body weight, child, parents, Medicaid, perception

Messages of Child Drowning Prevention: A Review of Newspaper Coverage from Midwestern Regional Papers

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Abstract

Background: Drowning remains the second leading cause of injury-related death among children ages one to 14 in the United States. The media, such as newspapers, and health professionals often have the opportunity to disseminate drowning prevention tips, such as those presented in the Safe Kids campaigns. This study sought to understand the print media's inclusion of water safety and prevention message in stories related to child drowning.

Methods: A content analysis was conducted to identify the inclusion of prevention and water safety messages with child drowning and near-drowning incidents reported in newspapers from the Midwest US.

Results: Newspaper articles including specific prevention and water safety messages within the text were identified. About 50% of the child drowning articles did not contain a prevention or water safety message. At least one of the four primary safety messages proposed through Safe Kids was present in 29.52% of the reviewed articles, however, only 5.29% of the articles included all four water safety messages. Entrapment was noted in 3.52% of the articles; only one article (0.44%) contained a message advocating for policy change.

Conclusions: Drowning or near-drowning incidents provide an opportunity for the media to educate the public regarding drowning prevention and water safety. The lack of prevention information included in such articles suggests a need for media education on the benefit to accompany child drowning stories with appropriate prevention messages. *KJM 2009; 2(4):87-91.*

Introduction

Drowning remains the second leading cause of injury-related death among children ages one to 14 in the United States.[1] In 2003, 782 children ages 14 and under died as a result of unintentional drowning, and in 2005, an estimated 3,019 children in this age group experienced near drowning non-fatal injuries.[2] However, according to the 2008 World Health Organization's report on child injury prevention, "Recent community-based surveys indicate that the problem of drowning is likely to be much greater than present global estimates would suggest" (p. 72).[3]

In 2000, Kansas reported drowning deaths as the fourth leading cause of unintentional injury death for children ages zero to 14 and 65% of unintentional drowning deaths were in the zero-to-four age group.[4] This age group also had the highest percentage of hospitalizations for near-drowning. Forty percent of deaths occurred in a swimming pool, 30% in a bath tub, 15% in a natural body of water, and in 15% the location was unspecified.[4] While the majority of incidents take place in residential swimming pools, children can drown in as little as one inch of water. Wading pools, bathtubs, buckets, diaper pails, and toilets can be unsafe for an unsupervised child.[5] Open water sites, such as lakes, rivers, canals, oceans, and drainage ditches, are also high-risk drowning sites.[6]

Although younger children involved in drowning incidents have a better survival rate than adolescents, the outcomes remain grim.[7] Children who survive face devastating health affects such as severe, permanent neurological disability, which often results in long-lasting psychological and emotional trauma. Near-drowning also takes a tremendous financial toll on the entire nation. Typical medical costs for a near-drowning victim range from $75,000 for initial treatment to $180,000 a year for long-term care.[8] The total cost of a single near-drowning resulting in brain injury can be more than $4.5 million. The total annual lifetime cost of near-drowning among children ages 14 and under is approximately $6.8 billion with children ages four and under accounting for half.

There are continued efforts to educate health professionals.[9] Those who treat pediatric drowning and near drowning victims continue to aid the prevention efforts.[10] However, primary prevention strategies are needed, such as targeted communication campaigns, to raise awareness in parents and caregivers about the dangers of drowning.[3] Such community-wide drowning prevention campaigns have demonstrated a significant, although modest, increase in reported life vest use and ownership among children,[11] and educational measures and messages have been reported to reduce the number of drownings in children.[12]

The most comprehensive primary prevention campaign for drowning was developed by Safe Kids Worldwide, a global network whose mission is to prevent accidental injury in children.[13] Founded in 1987 by the Children's National Medical Center and Johnson and Johnson corporation, Safe Kids is a grassroots organization that relies on local professionals and volunteers to increase injury prevention knowledge in parents, caregivers, and children through public events and dissemination of prevention materials for a wide range of injuries including burns, falls, and drowning.

The Safe Kids campaign[6] offers four primary safety messages regarding accidental drowning:

- SUPERVISION – Designate a responsible adult to supervise kids around water.
- ENVIRONMENT – Ensure safe swimming environments by installing multiple layers of protection around pools and equipping all water recreation sites with appropriate signage and emergency equipment.
- GEAR – Make sure the right safety gear always is used.
- EDUCATION – Teach children to swim and educate them about water safety.

These messages are disseminated to parents through campaign activities to prevent drowning by increasing knowledge.

Although recent studies have evaluated unintentional-injury coverage on local television news,[14] a gap exists in the research of national and regional coverage of child drowning and specifically, print media support of prevention messages. The only recorded publication related to newspaper coverage and reporting of drowning incidents, to date, involves research conducted in Germany.[15] This study addressed these gaps by providing a review of prevention messages offered in newspaper coverage of child drowning in Kansas.

Methods

Content analysis. A content analysis of articles from midwestern regional newspapers was conducted to analyze large volumes of data in a systematic fashion and to discover trends and patterns related to drowning prevention messages. Specifically,

reviewed articles included newspaper stories regarding unintentional deaths of children under the age of 15 (as is typically reported for child drowning) in water-related accidents.

The selection criterion for articles was decided prior to the review process and emergent coding procedures were established.[16] Search terms were selected and information was retrieved through the LexisNexis Academic database. Search terms included drowning, children; water safety campaigns; near drowning, children; and drowning, prevention. The scope of the articles reviewed included "general news" in "major papers" and "U.S. News" in "Midwestern Regional Papers" as prompted by the "Guided News Search". Two independent coders reviewed headlines for the retrieved articles and excluded articles not relevant to the research questions. Differences were reconciled by consensus. The second screen determined the message content (drowning prevention messages) based on a consolidated checklist and information included in the article.

Initially, 565 articles were retrieved from the Midwestern Regional Papers citation search locating articles from August 1, 2002 through August 1, 2006 related to drowning and children. Dates were selected to obtain five years of historical data beginning at the end of the summer swimming season. The preliminary screen excluded 336 articles including stories of intentional drowning, murders, or older children. The remaining 229 articles were screened, coded, and categorized using WEFT QDA software (http://www.pressure.to/qda/).

Results

Newspaper articles including specific prevention and water safety messages within the text were identified. If the message was an explanation of how the drowning occurred (i.e., all four drowned in a nine-foot-deep swirling pool after they apparently went to the water gardens to cool off) researchers did not consider the information to be sufficient, intended prevention message support, and those articles were coded as "No water safety or prevention message". Additionally, some of the articles provided a short bulleted list of the four Safe Kids primary safety messages at the close of the article, therefore, were coded as "all primary safety messages". Two other coding categories, "policy" and "entrapment" (i.e., filter suction and open water current dangers), were added.

About half (49.35%) of the child drowning articles did not contain a prevention or water safety message (Table 1). At least one of the four primary safety messages proposed through Safe Kids was present in 29.52% of the reviewed articles, however, only 5.29% of the articles included all four water safety messages. Entrapment was noted in 3.52% of the articles; only one article contained a message advocating for policy change.

Discussion

This research systematically reviewed the coverage of drowning stories in Midwestern newspapers to serve as a barometer for the presence of prevention messages in print media stories. Results could be an indication of a need for increased prevention messages. Newspapers should be encouraged to include the prevention strategies provided by Safe Kids to each story they cover on drowning or near-drowning. Messages could be contained within less than one inch of column space and include a statement such as, "This is the XX unintentional child drowning in the state this year. Prevention is the key, be sure you know the most effective ways to keep your child safe. Contact your local Safe Kids office for more information." By including such messages

Table 1. Child drowning articles from Midwestern newspapers results.*

Primary Water Safety or Prevention Message	Number of Articles	Percent of total articles
Supervision	19	8.37%
Environment	18	7.93%
Gear	19	8.37%
Education	11	4.85%
Other - Policy	1	0.44%
Other - Entrapment	8	3.52%
No Water Safety or Prevention Message	139	49.34%
All primary safety messages	12	5.29%
Total articles	**227***	

* Some articles indicated two types of messages such as active supervision and swim lessons

in articles to increase the drowning prevention knowledge of parents and caregivers, newspapers have the opportunity to implement a primary prevention campaign with the potential of saving children's lives.

While the content analysis revealed specific gaps in reporting prevention messages that might reduce child drowning, it did not include a representative sample for print newspapers throughout the United States. It would be beneficial to include all national papers, because the Midwestern states are land-locked and national trends could differ.

Great hope remains for the continued advancement of drowning prevention for children. Technological advancements for products such as sensor systems capable of differentiating children from adults,[17] coupled with fence laws and local policy improvements continue to support the prevention of children drowning. Work related to water safety continues to be conducted in the health education field. In addition, experts constantly are reviewing circumstantial evidence,[18] victim profiles, and location of incidence[19] to understand prevention measures better. As public health continues to address the global burden of drowning,[20] the print media must disseminate prevention messages that are relevant to health professionals, parents, and caregivers.

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Keywords: drowning, primary prevention, child, newspapers

Recurrent Epidural Abscess Caused by *Propionibacterium Acnes*

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Introduction

Epidural abscess is a suppurative fluid collection in the epidural space that, if not treated promptly, may result in severe consequences. It is caused most commonly by *Staphylococcus aureus* followed by Gram negative bacilli, streptococcus species, and coagulase negative staphylococci.[1,2] A rare case of recurrent epidural abscess caused by an unusual pathogen, *Propioni-bacterium acnes*, is presented.

Case Report

A 60-year-old Caucasian male presented with a two-day history of excruciating low back pain radiating to his left lower extremity. He received a trigger point steroid injection in the outpatient setting at the onset of his symptoms and had been using high potency non-steroidal anti-inflammatory agents with no relief. He then developed numbness and weakness of his affected limb.

The past medical history was significant for chronic back pain and an L4-L5 diskectomy for bulging disc and sciatica about five months prior to this event. He also received periodic trigger point steroid injections for his back pain. The patient had a history of systemic lupus erythematosus and was maintained on prednisone (10mg daily), methotrexate (15mg weekly), and hydroxychloroquine (200mg daily). He had no history of illicit drug use.

The review of systems revealed no bowel or bladder incontinence, no fever or chills, and no urinary symptoms. There was tenderness to palpation over the lumbar spine and the straight leg raising test was positive on the left side. The motor exam was limited due to considerable pain. Sensation to light touch on the left lower leg was impaired. Reflexes and rectal tone were normal.

The lab work showed leucocytes at 18,000 cells per mL, 78% neutrophils, erythrocyte sedimentation rate at 57 mm/hr, and C reactive protein at 17.9 mg/L. Blood cultures were negative.

Magnetic Resonance Imaging (MRI) obtained upon admission revealed an epidural abscess at L4-L5 (Figure 1). Intravenous (IV) vancomycin (1gm twice daily) was initiated and abscess drainage and evacuation with microdiskectomy was performed. High dose steroids were used to decrease post-operative inflammation and swelling.

The surgical tissue gram stain revealed gram positive coccobacilli and rare gram positive cocci in pairs. The culture grew a moderate amount of *Propionibacterium acnes* within ten days. Intravenous vancomycin was continued.

Eight days after the surgery, the patient had recurrence of acute onset of left leg pain, numbness, and weakness. A repeat

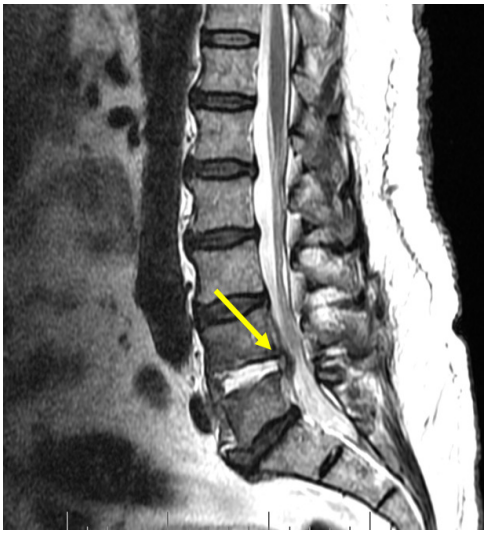

Figure 1. An epidural abscess and discitis at the L4-L5 level upon admission.

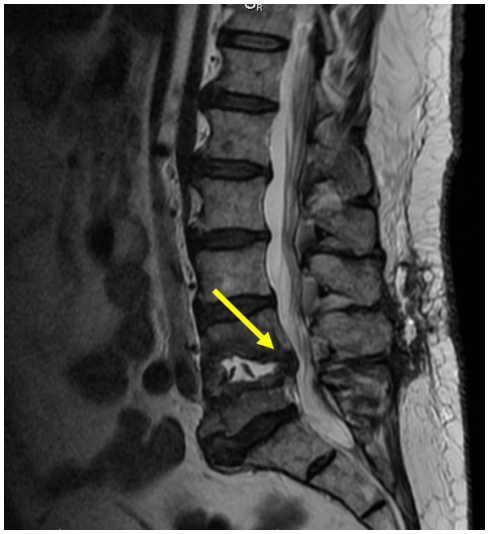

Figure 2. Evidence of osteomyelitis and recurrent epidural abscess.

MRI (Figure 2) showed a new fluid collection and evidence of osteomyelitis at L4-L5 level. The patient underwent evacuation and drainage of the abscess with good clinical results. The drainage catheter was removed three days later and he was dismissed with continued vancomycin treatment.

Twelve days after dismissal, the patient again presented with similar symptoms. Recurrence of the abscess was confirmed with MRI (Figure 3). This time, two catheters were placed intraoperatively, one for continuous vancomycin instillation for 24 hours and another for drainage. The patient showed great improvement post-operatively. He received IV vancomycin for a total of four weeks and was kept, thereafter, on suppressive treatment with oral minocycline 100mg twice daily for six months. He remained asymptomatic.

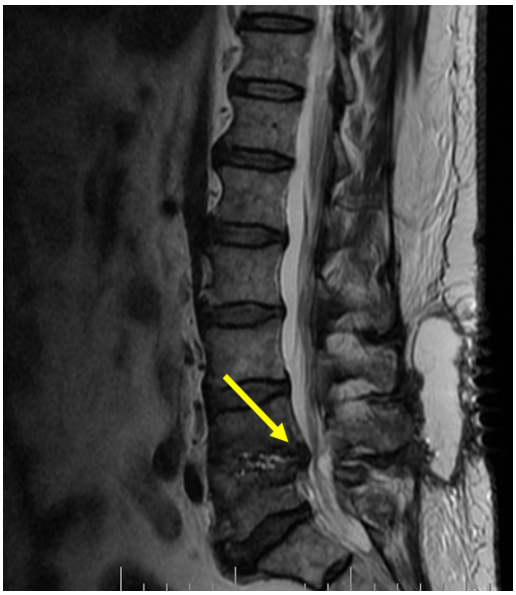

Figure 3. Recurrence of the abscess after the second surgery.

Discussion

The epidural space lies over the dura mater which is the outermost sub-osteal layer surrounding the brain and the spinal cord. Fat tissue is abundant in the lumbosacral region providing a favorable substrate for microorganisms. Collection of pus in the epidural space is referred to as an epidural abscess.[2] Clinical features include fever, back pain, and neurological deficits.[2-5]

Diagnosis is based on clinical features and MRI findings. MRI is the preferred diagnostic modality,[4-7] while computed

tomography (CT) with contrast and myelography are acceptable alternatives.[2,4,7-9]

Epidural abscess requires early recognition and treatment. The main determinant of outcome for patients with spinal epidural abscess is the neurological status at the time of diagnosis. Mortality rates for adults remains high (up to 14%) despite advances in diagnosis and treatment.[3,10]

Staphylococcus aureus accounts for about two-thirds of cases caused by pyogenic bacteria, followed by *Streptococcus pneumoniae* at 7.7%, *Staphylococcus epidermidis* at 5.2%, and a small percent of cases reported with viridans strep, *Escherichia coli*, citrobacter, serratia, and clostridium.[7] Propionibacterium is an extremely rare cause of epidural abscess and osteomyelitis. There are only four cases of discitis and/or osteomyelitis published in the English literature.[11-14]

Propionibacterium acnes colonize the skin and reside in the lipid rich microenvironment of hair follicles. They produce inflammatory mediators (lipase, neuraminidase, phosphatase, and protease) which cause papules or pustules or nodulocystic skin lesion characteristic of inflammatory acne. These are slow growing, non-sporulating, Gram-positive, anaerobic bacilli. The species requires culture for at least 7 to 10 days to ensure its isolation.[8,15]

Propionibacterium has been identified as a rare cause of brain abscess, subdural empyema, dental infections, endocarditis, conjunctivitis, vision threatening keratitis, peritonitis in association with peritoneal dialysis catheters, arthritis in association with prosthetic joints, and osteomyelitis.[5] Any causative organism of epidural abscess may spread from adjacent soft tissue or skin infection, via contaminated syringes, as a complication of invasive surgical procedure, or epidural catheters that remain for longer periods.[4,5,7,16,17] Only 26% of cases occur by hematogenous seeding following bacteremia.[3,18] In the illustrative case above, it is likely that the trigger point steroid injections that he received introduced this organism from the skin into the sterile epidural space.

Conditions which may perpetuate or make patients prone to developing an epidural abscess are diabetes, immunosuppression, steroids, alcohol, chronic renal failure, trauma, intravenous drug use, bacteremia, spinal injections, and catheterization or other forms of instrumentation.[3,4,6,7] Human Immunodeficiency Virus also is associated with epidural abscess.[8] The patient discussed above had several risk factors including immunosuppression with methotrexate, chronic steroids, and spinal injections. It is unknown whether the same risk factors contributed to his disease recurrence despite adequate therapy.

Standard treatment guidelines dictate medical management if the abscess is small and there is no neurological deficit. If there is neurological deterioration, management should include prompt surgical evacuation and drainage.[4] Patients usually are started on high dose steroids as soon as possible to decrease the swelling and reduce any developing neurological deficit. Steroids also provide some analgesia benefit.[19] CT guided drainage or drainage under fluoroscopy are options in uncomplicated cases.[10,18] With evidence of osteomyelitis, surgical debridement is required in addition to IV antibiotics for six to eight weeks guided by the microbiologic diagnosis.[7]

Based on these guidelines, our patient was treated appropriately with surgical evacuation and debridement and proper IV antibiotics. However, his epidural abscess recurred twice despite therapy. There were no significant data on direct instillation of antibiotics into the epidural space, though it might be considered in addition to systemic

antibiotics in refractory cases where standard treatments had failed.

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Keywords: epidural abscess, propionibacterium acnes, case report

Leukemic Meningitis in Chronic Lymphocytic Leukemia: A Rare Condition Responding to Intrathecal Methotrexate

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Introduction

Leukemic meningitis is a rare complication of chronic lymphocytic leukemia (CLL).[1-2] The incidence of meningeal disease was 1% for patients with CLL in a retrospective Scandinavian study.[3] The major components of treatment are intrathecal methotrexate and cranial irradiation.[1,4,5] Complete resolution is attainable with no adverse neurologic sequelae.

Case Report

A 44-year-old male known to have CLL developed altered mental status six days after being admitted for neutropenic fever and herpes zoster. The patient's CLL was diagnosed four years prior to admission and initially treated with cyclophosphamide, vincristine, and prednisone (CVP) chemotherapy. His CLL was CD38 (+) which is indicative of a more aggressive course. He achieved remission, but relapsed three years later.

At that time, the patient was treated with fludarabine-cyclophosphamide to remission. The most recent relapse was about one year later. He was treated with pentostatin. The disease progressed 14 days after the administration of pentostatin. One month later, the patient was treated with salvage rituximab/hyper-CVAD (cyclophosphamide, vincristine, doxorubicine and dexamethasone) part B. Afterward, the patient was lost to follow up and missed the second cycle of chemotherapy. His whereabouts were unknown for three months until he presented to the emergency room complaining of abdominal pain, nausea, vomiting, and severe fatigue.

The physical exam revealed a temperature of 103°F, ulceration of the posterior palate, supraclavicular adenopathy, splenomegaly palpated six centimeters below the costal margin, and an extensive vesicular dermatomal infiltrate extending from the midline of the back around the right flank to the midline of the abdomen. Similar lesions were noted over the trunk, right axilla, face, and scalp.

A complete blood count showed a white count of 13,500 (4% neutrophils); hemoglobin and hematocrit were 10.9 and 33.1 respectively. Sodium was 130, calcium was 11.9, and albumin 3.2 (corrected calcium = 12.86). The patient was admitted and started on IV vancomycin and cefepime for his neutropenic fever, IV acyclovir for his herpes zoster, IV fluids for his hypercalcemia (parathyroid hormone-related protein mediated response), and allopurinol to alleviate the effects of potential tumor lysis syndrome.

The patient had visual hallucinations (e.g., seeing animals) with confusion and agitation six days after admission. He had a history of alcoholism and was transferred to the intensive care unit, restrained, and treated with an alcohol withdrawal protocol. However, he showed no improvement. Interestingly, the patient told the nurses that

he was not having alcohol withdrawal as his previous experience with it was very different.

Given the presence of neutropenic fever, herpes zoster, and no improvement on the alcohol withdrawal protocol, a lumbar puncture was performed. It revealed glucose of 25, protein of 55, lactate dehydrogenase of 19, white count of 187 (95% of lymphocytes, 4% atypical lymphocytes) and the cerebrospinal (CSF) cytology revealed atypical lymphocytes.

The patient received hyper-CVAD cycle two. Intrathecal methotrexate 6mg was administered twice weekly. He had immediate resolution of the neurologic symptoms. Within 40 days, he manifested subsequent clearing of malignant cells in the cerebrospinal fluid and a Karnofsky score of 100 (i.e., no sign of disease).

Discussion

The differential diagnosis for the altered mental status in this case was broad. Alcohol withdrawal topped the list as the patient was an alcoholic having hallucinations after six days in the hospital. The lumbar puncture was necessary to reveal the leukemic meningitis.

The manner in which leukemic cells enter the central nervous system (CNS) is a subject of controversy, but the likely sources include hematogenous spread or direct spread from adjacent infiltrated bone marrow. The most common form of CNS spread or meningeal form of leukemia are divided in four categories: increased intra-cranial pressure (with vomiting, headache, papilledema, lethargy, seizure, and/or coma), visual disturbances (with diplopia, blurred vision, blindness, and/or photophobia), CNS palsies (e.g., in cranial nerves VI or VII), and other (with myelopathy, auditory, vertigo, ataxia, hallucinations, and/or nystagmus).[6]

The major components of the treatment for leukemic meningitis in CLL are intrathecal methotrexate and cranial irradiation.[1,4,5] Intrathecal steroids were used to treat the chemotherapy-induced encephalopathy.[2,5,7] Rituximab was reported to be effective in a case refractory to the conventional chemotherapy.[7] Fludarabine also was suggested to be helpful in inducing durable remission in patients with leptomeningeal involvement of CLL.[8]

The present case illustrated that a complete resolution of the leukemic meningitis associated with CLL is attainable with intrathecal methotrexate with no adverse neurologic sequelae.

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Keywords: chronic lymphocytic leukemia, meningitis, methotrexate

Primary Intraocular Lymphoma

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Introduction

Primary intraocular lymphoma (PIOL) is a subset of primary central nervous system lymphoma (PCNSL). PCNSL is usually a diffuse large B-cell non-Hodgkin's lymphoma in which malignant lymphoid cells involve the retina, vitreous, or optic nerve, with or without concomitant CNS involvement.[1,2] Because PIOL remains confined to neural structures, it is distinguished from primary orbital lymphoma and systemic non-Hodgkin's lymphomas that either involve or metastasize via the circulation to the uvea and ocular adnexa of the orbit, lacrimal gland, and conjunctiva.[3]

The incidence of PCNSL has increased in both immunocompetent and immunocompromised people from 0.027/100,000 in 1973 to 1/100,000 in the early 1990s.[4] The cause for the increased incidence in immunocompetent patients is unknown.[5] Ocular disease is bilateral in 80% of cases.[6] Previous reports suggested that approximately 80% of patients with PIOL subsequently will develop brain lymphoma.[7-9]

This report highlights the need for collaboration to improve our understanding and management of rare malignancies such as PIOL.

Case Report

A 50-year-old male, initially presented for blurred vision, more pronounced on the left, of three weeks duration. Ophthalmologic exam confirmed the presence of scattered vitreous cells. The eye angiogram was within normal limits and no findings were suggestive of papillitis.

A workup, including complete blood count (CBC), angiotensin-converting enzyme level, Human Leukocyte Antigen-B 27 and 51, antinuclear antibody test, and Rapid Plasma Reagin, was within normal limits except for a mild lymphocytosis. A hematology consult was requested.

The workup for lymphoproliferative disorders included an erythrocyte sedimentation rate (ESR), a positron emission tomography (PET) scan, a magnetic resonance imaging (MRI) of the brain, a bone marrow biopsy, blood flow cytometry, a lumbar puncture with flow cytometry and cytology, and a computed tomography (CT) scan of the chest, abdomen, and pelvis. All exams were within normal limits.

Over the next few months, the patient was treated with different modalities for vitreitis, including methotrexate, without improvement. Left vitrectomy was done 14 months after initial presentation. The flow cytometry on the vitreous fluid showed 11% monoclonal type B lymphocytes with lambda light chain restriction. Another workup, including ESR, PET scan, MRI of the brain, bone marrow biopsy, blood flow cytometry, lumbar puncture with flow cytometry and cytology, CT scan of the chest, abdomen, and pelvis, was within normal limits. The radiation oncologist was reluctant to consider this case as a primary intraocular lymphoma and to treat it as such.

The patient's vision improved after vitrectomy. However, he had right-sided blurriness. Right vitrectomy was done five months later. Cytology and flow cytometry on the vitreous fluid confirmed the presence of a large B cell lymphoma with lambda light chain restriction. The workup for systemic involvement was again negative.

The patient was treated with bilateral ocular radiation (6MV photons, 5 by 5.5 cm, to a dose of 3000 cGy in 200 cGy per fraction for 15 fractions). He was followed every six months with brain MRI, CBC, and a lumbar puncture with fluid cytology and cytometry without evidence of recurrence.

The patient reported headaches two years later (almost four years from the initial presentation). An MRI of the brain showed a large left frontal lobe tumor. He was treated with two cycles of CHOP-R for a presumed large B cell lymphoma relapse. CHOP-R is named after the chemotherapy drugs used in the treatment. It involves the monoclonal antibody ***r***ituximab, and the drugs: ***c***yclophosphamide, doxorubicin (chemical name ***h***ydroxydaunorubicin), vincristine (originally known as ***O***ncovin®) and ***p***rednisone.

The repeat MRI after the two CHOP-R cycles showed regression of the lesion. The patient completed a total of four cycles of CHOP-R, then underwent debulking surgery followed by whole brain radiation therapy. The pathology confirmed the diagnosis of diffuse large B cell lymphoma. The patient underwent autologous stem cell transplantation eight months after beginning CHOP-R therapy, followed by five courses of intrathecal cytarabine. The patient remained disease free four years later.

Discussion

At presentation, PIOL often is misdiagnosed as uveitis and may respond initially to corticosteroids, resulting in a delay of definitive diagnosis.[10] Patients may complain of blurred vision and floaters. Visual acuity often is better than would be expected based on the clinical examination.[10-13]

Given the nonspecific nature of eye findings in PIOL, patients being considered for this diagnosis should be examined for other causes of uveitis, including sarcoidosis, intermediate uveitis, multifocal choroiditis, acute posterior multifocal placoid pigment epitheliopathy, birdshot chorioretinopathy, toxoplasmosis, ocular tuberculosis, and acute retinal necrosis.[3] A diagnosis often is not made until there is brain progression at which time the prognosis is poor.[14] The most common finding on ocular examination is vitreitis. The posterior segment examination usually reveals vitreous cells, which may form clumps or sheets.[12,13]

PIOL is closely related to PCNSL. It seldom involves other organs, therefore, neuroimaging of the brain, orbits, and a lumbar puncture are required.[15,16] For patients with no evidence of disease by neuroimaging or cerebrospinal fluid (CSF), a diagnostic vitrectomy should be performed on the eye with the most severe vitreitis or poorest visual acuity.[17]

It is difficult to arrive at a pathologic diagnosis of PIOL.[7,18] Thus, research has focused on developing other methods to assist in the diagnosis of PIOL. These methods include immunohistochemistry, flow cytometry, molecular analysis, and cytokine evaluation.

Immunohistochemistry and flow cytometry rely on the finding that most PIOLs are monoclonal populations of B lymphocytes that stain for B-cell markers (CD19, CD20, CD22) and have restricted expression of kappa or lambda chains.[13,19,20] Immunohistochemistry also has been used to demonstrate expression of B-cell lymphoma-6 (BCL-6) and multiple myeloma oncogene 1 (MUM1) in PIOL cells.

BCL-6 is a B-cell marker that is normally turned off as B cells move from the germinal center into the marginal zone during B-cell differentiation.[21] MUM1 is a protein involved in the control of plasma cell differentiation. While B cells usually express one of these proteins at a time, concomitant expression has been shown in systemic diffuse large B-cell lymphoma.[22] Similar patterns of expression also have been demonstrated in five patients with PIOL.[23] Many still believe that a pathologic diagnosis is required to confirm the presence of PIOL and immunophenotyping plays a supportive role in diagnosis.[3]

Ocular specimens from patients with PIOL revealed immunoglobulin heavy (IgH) rearrangements in the third complementarity-determining region (CDR3) of the IgH variable region that can serve as a molecular marker of clonal expansion of lymphocytes.[24] Cytokines may play a role in distinguishing PIOL from uveitis. While interleukin 6 (IL-6) is produced in high levels by inflammatory cells in uveitis, IL-10 is produced by malignant B lymphocytes in intraocular and CNS lymphoma. PIOL is associated with an increased IL-10 to IL-6 ratio (greater than 1.0).[25]

These patients should undergo neuroradiologic imaging and CSF examination. No further ocular diagnostic tests are required in patients with positive CSF. In patients with negative CSF, a vitrectomy or vitreous tap should be performed in the eye with more severe vitreitis or worse visual acuity. This sample should be sent for cytology, cytokine analysis, IgH rearrangements, Bcl-2/IgH translocations, and immunohistochemistry/ flow cytometry.

Chorioretinal biopsies may be required when vitrectomy specimens are nondiagnostic. Because of the cytolytic nature of corticosteroids on lymphoma cells, corticosteroid treatment should be withheld until all diagnostic procedures are completed.[3]

The optimal method of treatment for PIOL or PCNSL with ocular involvement is yet to be determined. Local ocular treatments include ocular radiotherapy[6,26] and intravitreal methotrexate.[27] Due to radiation complications and the fact that this treatment cannot be repeated if the patient relapses, intravitreal treatment has become more desirable for both isolated and recurrent ocular disease.[27,28] Extensive treatments include whole brain radiotherapy (which includes the posterior retina), high-dose methotrexate[29], cytarabine alone and in combination with methotrexate[30-32], as well intrathecal chemotherapy.

Grimm et al. retrospectively studied 83 HIV negative, immunocompetent PIOL patients from 16 centers in seven countries.[14] All had disease confined to the eyes at diagnosis with no evidence of brain, systemic, or spinal cord lymphoma. Initial treatment was categorized as focal in 23 (intra-ocular methotrexate, ocular radiotherapy) or extensive in 53 (systemic chemotherapy, whole brain radiotherapy) patients. Six patients received no therapy and the details were unknown in one. Forty-seven patients relapsed (brain 47%, eyes 30%, brain and eyes 15%, and systemic 8%). Median time to relapse was 19 months. There was no statistically significant difference in progression free survival (PFS) or overall survival (OS) regardless of the treatment modality. Median PFS and OS were 29.6 and 58 months, respectively, and unaffected by treatment type.

Intensive chemotherapy followed by autologous stem-cell transplant was reported to rescue patients with refractory or recurrent PCNSL and PIOL. A study of 22 patients with PCNSL included 11 patients with PIOL (3 with isolated ocular disease and eight with concomitant CNS

involvement).[33] Five of the eight patients with CNS disease had partial or complete response and had survival times of 18+ to 70+ months. One of these patients had systemic progression and died in 3 months. Two had ocular recurrences. One had complete response with subsequent ocular radiotherapy, while the other died due to a second tumor. Two of the three patients with isolated ocular disease had complete response, while the other patient with isolated ocular disease had intraocular lymphoma recurrence at three months, then died of a second tumor. Only one of the 11 patients with PIOL experienced neurotoxicity. Seven of the 22 patients experienced this side effect. In addition, this treatment was not recommended for patients older than 60 years of age, because 5 of 7 patients in this age group died of treatment complications.

Conclusions

PIOL often is misdiagnosed and patients should be examined for other causes of eye disease when considering this diagnosis. A pathologic diagnosis of PIOL may not be found. Cytokines help to distinguish PIOL from uveitis. Neuroradiologic imaging, CSF examination, vitrectomy, and/or vitreous tap each may play a role in diagnosis. Depending on the patient, treatment of the PIOL may be focal or extensive. Chemotherapy also may be necessary. Often, prognosis is poor because of the disease progression that occurs before diagnosis.

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Keywords: B-cell lymphoma, central nervous system neoplasms, eye diseases, case report

Be aware of B19

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Introduction

Sickle cell parvovirus B19 transient aplastic crisis is a relatively common occurrence that can require hospitalization with a multi-modality treatment plan including a complete exchange transfusion. We report a case of sickle cell parvovirus B19 transient aplastic crisis that required multiple complete exchange transfusions.

Case Report

A 31-year-old, African-American woman presented to the emergency department after a two-week history of increasing generalized pain, with particular emphasis in the legs bilaterally, left arm, and chest. The pain was aggravated by increased movement, but continued while at rest. She had been vaccinated against tetanus, and against streptococcus *pneumonia* with Pneumococcal Vaccine Polyvalent (Pneumovax®), but not for meningitis.

A review of systems was positive for dehydration, decreased appetite, and subjective fevers for three days. Her past medical history included sickle cell hemoglobinopathy, thrombosis secondary to a peripherally inserted central catheter line, laparoscopic cholecystectomy, and a caesarean section. She had a history of smoking and drinking alcohol. She was taking acetaminophen/oxycodone and folic acid.

The patient was mildly obese. She was well-nourished and well-developed, but was in distress from her pain. She was tearful.

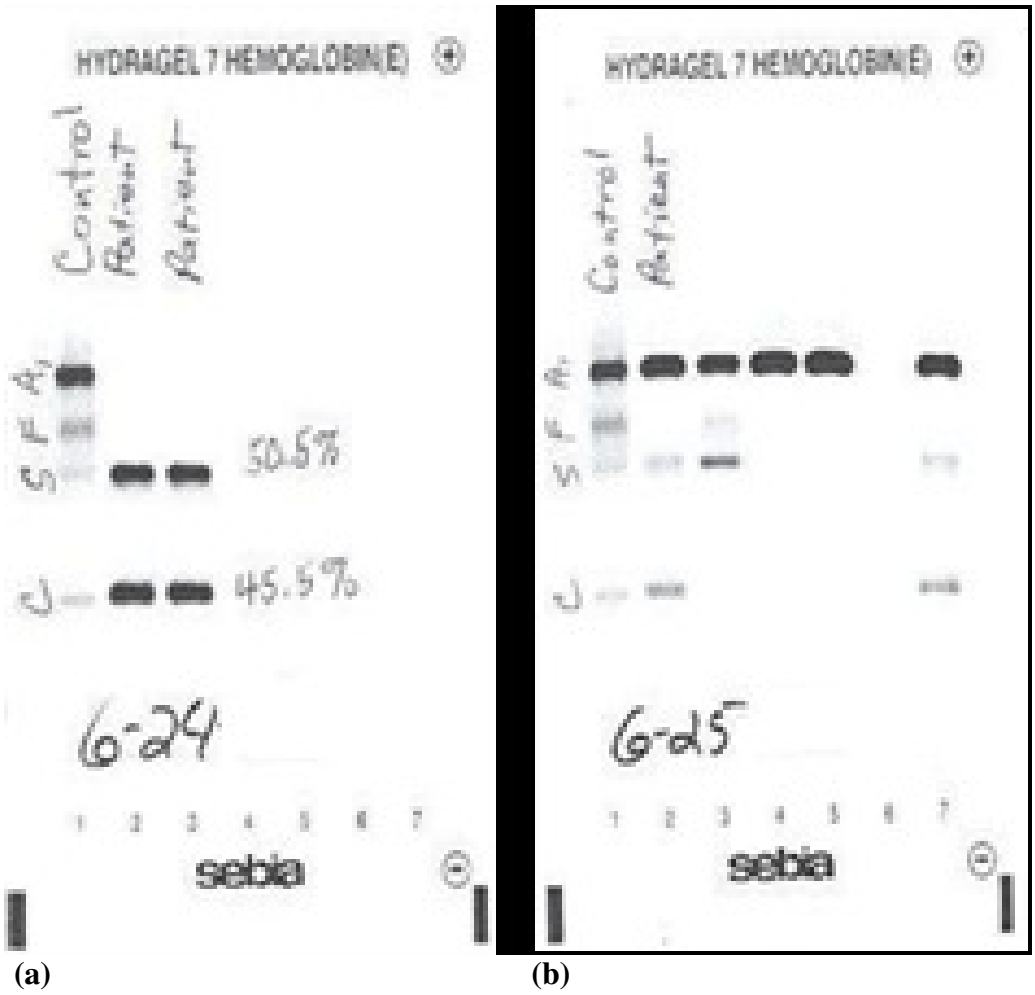
Her vital signs were abnormal for respirations of 24 breaths per minute and a blood pressure of 146/86 mmHg. She had dry mucous membranes of the oral and conjunctival mucosa. A midline caesarean scar had no evidence of erythema or dehiscence. There was no evidence of hepatosplenomegally. She had eczema of the right calf. Her sternum was tender to palpation. Initial laboratory data showed a white blood cell count of 35.2 X 10^3 cells/mm^3 with no left shift, a hemoglobin of 6.9 gm/dl, a mean corpuscular volume of 98.6 fL, with platelets of 1337 X 10^3/mm^3. A blood smear showed target cells, schistocytes, and ovalocytes. Additional labs showed a reticulocyte count of 2.5%.

A chest x-ray revealed patchy infiltrates in both lower lobes. A two-dimensional echocardiogram revealed a pulmonary arterial pressure of 50-55 mmHg. A brain natriuretic peptide showed results of 1185 pgmol/liter. Liver function tests revealed a maximum alanine aminotransferase of 1736 units/liter and a maximum aspartate aminotransferase of 2184 units/liter. Lactate dehydrogenase tests reached a maximum of 4273 units/liter. Direct Coombs test and cold agglutinins tests were negative. A

hemoglobin electrophoresis yielded hemoglobin S 53.7% and hemoglobin C 46.3%. Blood cultures were negative. A streptococcus pneumonia urine antigen was negative.

A titer for parvovirus B-19 revealed an IgM of 10.40 mg/dl and an IgG of 4.75 mg/dl. Sickle cell SC aplastic crises with parvovirus B-19 Infection was diagnosed.

The patient was placed on three liters of oxygen. She was given packed red blood cells, but they did not normalize her anemia. She initially was given IV antibiotics, fluids, and pain medications. Antibiotics were discontinued after a 10-day regimen. She was given one complete exchange transfusion to remove the sickled cells, then received a hemoglobin electrophoresis which revealed that her erythrocytes were still sickling (see Figure 1a). Another complete exchange transfusion was performed and another hemoglobin electrophoresis which then indicated resolution (see Figure 1b). Supportive therapy was given. During her hospital stay, she developed acute renal failure which resolved. She was discharged on pain medications with plans to improve hydration habits.



(a) **(b)**

Figure 1. (a) The first hemoglobin electrophoresis illustrates that anemia was not treated adequately with the exchange transfusion, most likely due to the parvovirus. (b) Another exchange transfusion was necessary for resolution.

Discussion

Sickle cell SC is a disorder of hemoglobin that leads to polymerization of hemoglobin S in erythrocytes causing cell sickling.[1] The hemoglobin C gene is one-fourth as common as the hemoglobin S gene, which is around 8% of the African-American population.[2,3]

Parvovirus B-19 is a virus that is directly toxic to human erythroid precursor cells. More than seventy percent of adults have measurable parvovirus B-19-specific IgG antibodies.[4] Sickle cell anemia commonly presents as recurrent painful crises. Intermittent bouts of sickling will cause vasoocclusion in connective and musculo-skeletal tissue causing a painful ischemia.

Most painful crises will present with acute pain, tenderness, fever, tachycardia, and anxiety. When these infarctions occur in the pulmonary vasculature, it can cause acute chest syndrome, which is a medical emergency. It can lead to pulmonary hypertension which causes a secondary right sided heart failure.[5]

Sickle cell anemia aplastic crises can occur when a parvovirus B19 strain infects the host. The sickle cell anemia in crises is exacerbated by a loss in erythropoiesis due to the B19 toxicity to erythroid precursors. Labs will show abrupt decreases in hemoglobin without a compensatory reticulocytosis. Definitive diagnosis of Sickle cell SC hemoglobinopathy is determined by hemoglobin electrophoresis.

Sickle cell hemoglobinopathies are suspected in a history of hemolytic anemia, as well as a characteristic sickling seen on a blood smear.[5] The practical choice for diagnosing immunocompetent individuals with acute parvovirus B-19 infections is serum IgM and IgG antibodies or PCR. Additionally, decreased or lower than expected reticulocyte counts might be noted.[6]

Treatment of a sickle cell aplastic crisis focuses on supportive care, identifying the problem, and treating the patient's acute problems in a timely manner. The main treatments include giving blood transfusions until the patient's immune system has cleared the virus, and reticulocytes and red blood cell function have returned. In severe and chronic cases, IgG infusions might be needed.

In a longitudinal study of 308 patients with hemoglobin SS, 91 out of 114 (80%) who were infected with B19 developed a transient aplastic crisis.[7] Another study in 633 children with sickle cell disease indicated that 68 parvovirus B19 aplastic crises occurred over a five-year period.[8]

Prevention of parvovirus B19 infection is best achieved by using good infection control practices. A vaccine given to 24 seronegative adults in a series of three doses over six months was highly immunogenic.[7,9] Prevention of sickle cell crisis involves lifestyle changes and planning ahead. Hydration is important to maintain erythrocytic volume. Staying away from hot or cold environments or stressful situations also can prevent recurrence.

Antibiotic prophylaxis in splenec-tomized patients prior to procedures or dental work also might prevent recurrence as well as pneumococcal and meningitis vaccines. Hydroxeurea also will help by inducing hemoglobin F production and decrease the amount of time that hemoglobin is in the deoxygenated form (tense) form.[5]

The need for two complete exchange transfusions is unusual in that one complete exchange transfusion typically replaces the sickling erythrocytes and resolves such a crisis. Although there have been cases of multiple partial exchange transfusions,[10] no other case reports are known describing the

need for more than one complete exchange transfusion in a sickling crisis with acute chest syndrome. Therefore, our case indicates that multiple complete exchange transfusions can be warranted in such cases of sickle cell crisis.

Conclusion

Because sickle cell disease is a common condition in certain populations in the US and the very high existence of parvovirus B19 exposures in the general population, one must always carry a high suspicion for sickle cell disease parvovirus B19 aplastic anemia in sickle cell patients presenting with a crisis. The acute treatment usually is hospitalization with hydration, symptom management, and in serious cases, the possibility of more than one complete exchange transfusion.

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