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ORIGINAL ARTICLE

Survey of parents' perception and perspective on airway and anesthetic management in their children with Pitt Hopkins syndrome: Mapping out their clinical care odyssey

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ABSTRACT

Objective: Pitt-Hopkins Syndrome (PTHS) is characterized by cognitive dysfunction, developmental delays, seizures, and several anatomical abnormalities. These abnormalities may have an impact on airway and anesthetic management. In rare syndromes, many variants exist with potentially different interactions between the children's medications used for treating their condition and anesthetic agents.The study's aim was to develop a survey for the parents of patients with PTHS to determine their perception related to airway and anesthetic management. Further,in order to obtain an in depth point of view on their children's experiences we examined the parents' perspective.

Methodology: A survey (paper and web-based) consisting of 31 questions was developed and distributed at the Pitt-Hopkins Research Foundation Scientific Symposium and Family Conference in Dallas, Texas from November 3-5, 2016. The survey questions were developed after an extensive literature review of PTHS supplemented with input from certain families of patients with PTHS. The focus of the survey was to obtain the parents' perception related to airway and anesthetic management and additionally, their perspective of overall care using follow-up telephone calls and interviews to develop narratives.

Results: We received 32 survey responses (31 paper and 1 web). Five were not analyzed since the children had not received either sedation or general anesthesia. The parents' perceptions related to airway and anesthetic management were as follows: 22 of 27 (81.4%) patients did not report any complications related to airway management. There were no reported episodes of aspiration even though 23 of 27 (85.2%) patients suffered from GI issues: either upper (reflux), lower (constipation), or both. Sixty-three percent (17/27) of respondents reported poor quality of emergence, while 26% (7/27) described delayed emergence. We found there were many different variants of patients with PTHS regarding their verbal, cognitive, and ambulatory abilities, leading to a wide variety of experiences with anesthetics obtained from parents' interviews and narratives.

Conclusion: Our study found a low incidence of problems with airway management in children with Pitt-Hopkins syndrome. Their problems with anesthetic care were specifically related to poor quality of emergence, though the exact etiology was not clear.Their perspective in the form of narratives offered more insight into their fears, frustrations, and expectations for their children's care.We obtained valuable information on their experiences after discharge, which is usually not available on the medical records or hospital documentation charts.

Key words: Survey; Parents; Perspective; Airway; Anesthesia; Pitt-Hopkins syndrome

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INTRODUCTION

Pitt-Hopkins syndrome (PTHS) is a rare, genetic syndrome affecting approximately 200-300 patients worldwide.[1] Genetic mutation of the Transcription Factor 4 (TCF4) gene is a known cause of PTHS.[2] Pitt-Hopkins Syndrome can be characterized by intellectual disability, irregular gait pattern, and facial abnormalities such as deep-set eyes, broad nasal bridge, and wide mouth.[1-4] Patients may also present issues with seizures, hyperventilation, and gastrointestinal (GI) problems such as reflux and/or constipation.[3]

These abnormalities may present challenges to the anesthesiologist when patients are scheduled for either noninvasive diagnostic procedures, or surgeries. In patients with PTHS, breathing abnormalities characterized by periods of hyperventilation, and apnea may lead to low oxygen saturation levels.[5-7] These issues may place patients at an increased risk for severe desaturation after sedation or general anesthesia. In addition, antiepileptic medications may interact with many different agents used for sedation and/or general anesthesia.[8] Difficult airway management, such as the inability to visualize the vocal cords because of facial abnormalities has also been reported in PTHS patients.[9] Aspiration is another potential risk due to their high incidence of GI problems.[3]

Due to their intellectual disabilities affecting their cooperation and/or temperament, PTHS patients may not be able to communicate with the physician; therefore, their parents are the main medium through which the patient communicates. Furthermore, parents of children with rare syndromes are often the most familiar with the specific peculiarities of their child's variant of the syndrome.[3]

Parents' perspective and knowledge about their child's care may provide physicians with insight into children with rare syndromes, especially when few studies are available. By focusing on the families' needs and concerns, physicians may be able to provide improved patient-centered care.[10,11] Frequently, guidelines specific to patients with syndromes do not exist, and anesthetic techniques are often extrapolated from their non-syndromic counterparts. Therefore, development of specialized protocols and best practices for these patients is needed.

We developed a survey on the parents' perception of airway and anesthetic management in their children with PTHS, and their perspective, in the form of narratives, on their overall clinical care.

METHODOLOGY

The study was approved and consent waived by the Wake Forest University Health Sciences Institutional Review Board as part of a pediatric difficult airway study. A web-based survey was posted on the Wake Forest School of Medicine's Department of Anesthesiology website on October 31, 2016, and a paper version was distributed at the 2016 Pitt-Hopkins Research Foundation Scientific Symposium and Family Conference in Dallas, Texas (November 3-5, 2016). We excluded PTHS patients with no history of sedation or general anesthesia from the final analysis. The survey consisted of 31 questions concerning the parents' perception of airway and anesthetic management in their child and their perspective of the overall clinical care (https://www.wakehealth.edu/pitt-hopkins-survey/). Survey questions were developed after an extensive literature search of PTHS and additional input from several families of PTHS patients. Data collected included: demographics, airway issues during sedation and/or general anesthesia, history of GI issues, seizure incidence and medications, quality of wake-up/emergence from sedation or general anesthesia, and overall satisfaction with clinical care. To gain additional perspective and foster narratives, the parents were contacted via email and follow-up telephone interviews. The narratives expanded and clarified their experiences and understanding of issues related to their child's clinical care and provided us with their perioperative concerns and experiences after discharge from the hospital.

Statistical Analysis:

Data were entered into Microsoft Office Excel 2010 (Redmond, Washington). Descriptive statistics, including mean, standard deviation, and range, were used. Point estimates are reported as mean ± 95% confidence interval (CI).

RESULTS

Demographics

In total, 32 parents of PTHS patients responded to the survey (31 paper-based at the conference and 1 via the web-based form). Twenty-seven of the PTHS patients (84.4%) had previously received sedation or general anesthesia for a procedure and/or surgery; thus, 5 were not analyzed. The mean age (years) and range of the patients analyzed was 8.7 ± 4.6 years (range 3-20). There were eighteen males and nine females.

Perception of Difficult Airway or Related Complications

Twenty-four of the 27 (88.9%, 95% CI 71-98) parents were never told that their child's voice box was difficult to either visualize or place a breathing tube, and 3 (11.1%) did not answer. The majority of respondents (22/27, 81.48%, 95% CI 62-94) denied having complications related to seeing the voice box or placing a breathing tube, 1 (3.70%, 95% CI 0.09-19) parent was not sure, and 4 (14.82%) did not respond. No one reported the cancellation of a procedure or surgery due to airway problems or complications.

Perception of Anesthetic Management

See Table 1 for airway and breathing issues during sedation and/or general anesthesia, gastrointestinal issues, incidence and medications used to treat seizures, and wake-up/emergence from sedation or general anesthesia.

Parent Satisfaction with Airway Management and Anesthetic Care

Nine of the 27 (33.3%, 95% CI 17-54%) parents reported that they strongly agree with being satisfied with their child's airway management, 14 (51.8%, 95% CI 32-71%) reported in agreement, 1 (3.7%, 95% CI 0.09-19%) disagreed, and 3 (11.1%) did not answer.

The parent in disagreement stated that she was dissatisfied with the use of general anesthesia for dental work. Eleven of the 27 (40.7%, 95% CI 22-61%) reported that they strongly agree with being satisfied with their child's care for sedation and/or general anesthesia, 11 (40.7%, 95% CI 22-61%) reported in agreement, 2 (7.4%, 95% CI 0.91-24%) somewhat agreed, 1 disagreed (3.7%, 95% CI 0.09-19%) and 2 (7.4%) did not answer. The same parent was in disagreement with overall care because the parent felt that the child was discharged prior to emergence from anesthesia.

frequency of diagnostic procedures required. Although the risks and the dangers of chronic exposure to anesthesia have been studied in neonates and other children, they have not been well-studied

in those with rare syndromes, specifically PTHS.[12] Furthermore, despite many guidelines and best practices for management in healthy children, there is a lack in those with rare syndromes.

Taking into account the parents' perception of their child's experiences will assist us in the development of specialized protocols for improved patient-centered care for children with rare syndromes.

Table 1: Patient related issues during sedation and/ or general anesthesia and on wake-up/emergence

Patient related issues	N=27	Percent	95% CI
Airway, Breathing and Related Issues			
Improvement with age of airway-related issues			
No improvement with age	12	44.5	25 – 65
Improvement with age	1	3.7	0.9 – 19
Were not sure	4	14.8	4.2 – 34
Did not state	10	37.0	
Difficulty breathing during sedation or general anesthesia			
Not at all, O_2 was great	14	51.9	32.0 – 71.3
O_2 was a little low, but relative to expected level	3	11.1	2.1 – 29.2
O_2 was abnormal and required additional O_2	1	3.7	0.1 – 19.0
Child had a hard time breathing and needed intervention	0	0	0 – 12.8
Child stopped breathing and required intervention	0	0	0 – 12.8
Did not state	9	33.3	
Gastrointestinal Issues			
Incidence of GI issues			
Yes	23	85.2	66.3 – 95.8
No	4	14.8	4.2 – 33.7
Did not state	0	0	
Positive for upper GI problems	1	3.7	0.11 – 22
Positive for lower GI problems	14	51.9	39 – 80
Positive for upper and lower GI problems	8	29.6	16 – 57
Vomited and/or aspirated			
Yes	0	0	0 – 12.8
No	26	96.3	81.0 – 100
Did not state	1	3.7	
Seizure Activity and Medications			
Incidence of Seizure Activity			
Yes	5	18.5	6.3 – 38.1
No	21	77.8	57.7 – 91.4
Did not state	1	3.7	
Medication for Seizures*			
Cannabis	2	40	5.3 – 85.3
Divalproex sodium	1	20	0.5 – 71.6
Lamotrigine	2	40	5.3 – 85.3
Oxcarbaxepine	2	40	5.3 – 85.3
Topiramate	1	20	0.5 – 71.6
Emergence			
Wake-up/Emergence from Sedation/Anesthesia			
Well	9	33.3	15 – 54
Not well	17	63.0	42 – 81
Not sure	1	3.7	0.1 – 19.0
Did not state	0	0	
Slow to Wake-up/Emergence from Sedation/Anesthesia			
Yes	7	26.0	11 – 46
No	19	70.4	50 – 86
Not sure	1	3.7	0.1 – 19.0
Did not state	0	0	

**Some patients received more than one medication*

Table 2: Perioperative perspective of the parents in the form of narratives

Parents' Preoperative/ Intraoperative Concerns	Examples		
Risk	"He was tachycardiac for months and I think it was worsened by anesthesia"	"Nitrous oxide during dental procedure turned him into the "hulk"®* and he became very violent and bit through the bite block"	"Do all of the frequent anesthetics my child has received have an effect on his brain long term?"
Inquisitiveness	"Why does my child need to go under general anesthesia every year for a routine dental procedure?"	"If he will not hold still for an EEG, do we have to risk general anesthesia?"	"My child's mutation is not the same as most of the other children with PTHS, but he still receives the same medications as the others"
Fear	"My son gags every so often when he falls asleep, so I am fearful that it can happen while he's under anesthesia"	"If my child responds differently to medicines, how do we know he won't respond differently to general anesthetics?"	"A lot of information is available on the internet, but it is confusing and contradicting"
Frustration	"Physicians do not seem to listen to what we parents have to say; they trivialize our concerns"	"My son is different, why do we treat him with the same medication as healthy children?"	"There is nowhere for me to look for concerning the risk of anesthesia when my child needs procedures or surgery"
Parents' Postoperative/ Discharge Concerns	**Examples**		
Risk	"When is it safe to discharge my child, because he is very sedated and sleepy after procedures?"	"There are no protocols for PTHS children so how do we know best practices are being used?"	
Inquisitiveness	"Why treat my child postoperatively the same as other children or his siblings when they respond differently?"	"Is it normal for my child to wake up very wild after surgery?"	
Fear	"My son didn't sleep for 36 hours after general anesthesia"	"My child recovers differently depending on which medications were used and which procedure was being done"	
Frustration	"My child wakes up very agitated and angry"	"The dentist rushed us out of the office so my son would not remember the place, but he was not ready for discharge"	
Miscellaneous	**Examples**		
Improvement of Care	"The basic science research is very active, but clinical problems and issues with anesthetics is not"	"More is known genetically, but still a lot is unknown about if the same mutation variants react the same to anesthetics"	
Novel use of technology by patients	"He can pick out books he wants to read on an iPad"	"He can use an iPad® app to tell you what he wants"	

**Fictional superhero who is very strong and powerful*

Our survey results indicated that there were no challenges resulting from airway management or GI issues, instead the challenges were mainly with quality of wake-up/emergence. The medical literature states that airways may be challenging to intubate in children with PTHS; however, our findings did support this as none of our survey parents were told their child was difficult to intubate.[9] Breathing abnormalities reported in the literature focused on hyperventilation and apnea, again, however, our parents did not report these to be an issue.[5-7] Parents reported frequent problems with wake-up/emergence from sedation and/or general anesthesia—specifically poor quality and/or delayed wake-up/emergence. However this is not reflected in the literature. This discrepancy may be due to the lack of the parents' awareness regarding the qualities of emergence in other children, or that children with PTHS have different emergence characteristics. The lack of data on PTHS and anesthesia in the literature makes the parents' perspective invaluable to better understand the PTHS child's reactions.

Our reported incidence of GI issues was similar to that of the literature in that lower GI problems outweighed upper.[1,2] In addition, despite the high incidence of GI

problems reported both in our survey and in the literature, there were no reported cases of aspiration.

Most of those in our survey who reported recurrent seizures were on a combination of antiepileptic medications. Our incidence of seizures was similar to some studies[2-4] at approximately 20%; however, Sweatt reported a 50% incidence of seizures.[1]

The parents of children with PTHS offered a unique perspective on clinical care. They provided a broad perspective on their children's perioperative care—from pre- to weeks post- discharge. The information they provided with regards to their child's reactions after discharge was most insightful, as this is not usually available or discussed in the medical records.

We found that parents use multiple internet sources and other support systems, such as other PTHS families, to gain insight and compare experiences. Although this may be perceived as very helpful, it could lead to "a diagnostic odyssey" in which the parents receive different, and at times, conflicting information from different sources, leading to confusion and frustration. Some parents were also frustrated because they felt that certain physicians did not truly listen to their concerns, but rather dismissed their points of view. One study found that the attention given to a patient's concerns is one of the most integral aspects of a patient's perception of anesthetic care.[13] Parents felt that physicians often times explained common reactions to medications, but failed to listen to their anecdotes of their child's past experiences. In general, the PTHS parents demanded exceptional care designed specifically for their children. For example, one parent sought out a dentist who would delay routine annual dental exams, instead opting to perform dental procedures at developmental milestones (e.g. at puberty and wisdom teeth appearance) because of the child's past negative experiences with general anesthesia. In addition, the parents were very willing to share their perspective because they wished to improve and learn from these experiences, and were excited about the direction of their children's care.

The narratives we collected reflect the wide spectrum of patients with PTHS and their unpredictability during anesthesia (e.g., such as reactions to medications and their quality of emergence). Care should be taken to treat each PTHS patient based on his or her specific permutation of PTHS. Therefore, it is important when devising an anesthetic plan for a PTHS patient to consider the parents' perspective, especially in regards to their child's history of medications and reactions, rather than attempting to extrapolate from preexisting protocols that are in place for the non-syndromic children, since this may provide the most accurate information.

Our survey results highlight the need for improved communication with the parents of PTHS patients to minimize their anxiety and fear regarding their child's anesthetic management. Patient-centered care is necessary to provide a comfortable experience for the patient and caregivers.[14] Better patient rapport is essential for this, which was the goal of our survey.[10] Dissemination of our survey results will allow physicians to focus more directly on the specific needs and concerns of patients with PTHS.

LIMITATIONS

There were several limitations in this study such as a small sample size due to the rarity of the syndrome, and the inability to advertise to every parent with a child with Pitt-Hopkins. Our sample consisted of only English-speaking patients in the United States. Lack of response to specific survey questions limited our ability to draw conclusions regarding other anesthetic issues. Likewise, our finding that improvement in airway issues occurred with increasing age may not be reliable since many of the respondents reported never initially having airway problems, e.g., our survey results indicated that most parents were never told that their child's voice box was difficult to visualize or that there was difficulty in placing a breathing tube. Even though parents were not told of any problems, this does not mean that there were not any. Medical records were not reviewed; however, obtaining the parents' perceptions and perspective concerning the discharge experiences at home was our main objective since this is not usually available in the medical record. Not all parents provided a narrative via telephone interview, and those who did may have been the parents most motivated and willing to share their experiences.

CONCLUSIONS

In summary, the major area of concern was quality of wake-up/emergence from sedation and/or general anesthesia. We collected the parents' perception (survey) and perspective (narratives) regarding their PTHS children's clinical care with the intent to develop an alternative approach to both patient- and family-centered care in children with rare syndromes. We believe this is important since the parents of a child with a rare syndrome are often times the most informed on their child's condition and responses to

medical treatment, especially on what occurs after discharge from the hospital. Further studies should be focused on developing a guide to help families and physicians in developing protocols and best practices for all the variants of children with rare syndromes.

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Authors' contributions:
YB: Design of study, survey analysis, manuscript preparation
KJ: Distribution of survey, data and statistical analysis, manuscript preparation
DM: Data and statistical analysis, manuscript preparation
SP & AB: Manuscript preparation
VP: Design of survey

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