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Child Sexual Abuse: Can Anatomy Explain the Presentation?

Dena Nazer, MD,1 and Vincent J. Palusci, MD, MS2

This article discusses a 4-year-old girl who displayed behavioral symptoms consistent with posttraumatic stress disorder. She was recently placed in foster care due to emotional and physical neglect. During her clinic visit, she disclosed being sexually abused by her father with a knife. Results of her general and anogenital physical examinations were normal. The case discussion proposes an explanation for how a maltreated child (1) develops behavioral problems, (2) has a normal genital examination despite the history of sexual abuse, and (3) has an implausible disclosure of her father hurting her with a knife. As part of the Integrating Basic Science into Clinical Teaching Initiative series, basic science principles are the method of explanation. The case discussion is an attempt to understand the science responsible for the disease that is present and make that understanding useful for future clinical problem solving.

Keywords: sexual abuse; posttraumatic stress disorder; emotional neglect

Integrating Basic Science Into Clinical Teaching Initiative

A cornerstone of pediatric education has been that the care of children should reflect our knowledge of the dynamic interaction of genes, environment, and time on human biology. The rapid increase in information obtained within the last decade through functional imaging and genetic and behavioral studies on the unique importance of specific developmental stages on subsequent health and functioning provides a stark contrast with the limited information on this topic contained in clinical training for medical students and pediatric and family medicine residency training.1

Pediatric educators nationwide are challenged by this gap, leaving some to believe that much of current pediatric training may be unhinged from both the significant advances in knowledge in the basic sciences and to emerging clinical realities.1

This case discussion is an attempt to understand the science responsible for the disease that is present and make that understanding useful for future clinical problem solving.

Introduction

Autumn, a 4-year-old girl, presents to the Child Protection Center clinic with a chief complaint of “acting weird for the past 3 weeks.” She was referred by the Child Protection Services (CPS).

Her foster mother, with whom she has been living for the past 3 weeks, noticed that Autumn appears very distant, often rocks back and forth, and does not talk much. It is very hard for her to sleep, and when she does, she has nightmares and wakes up crying in the middle of the night. She also rubs herself in the genital area frequently and is afraid to be left alone with the foster mother’s husband.

Autumn was placed in foster care 2 months ago because she was found home alone and unsupervised, while her biologic mother was “out with one of her boyfriends.” The house was poorly kept, there was little food, and it appeared that Autumn had been left in a locked room for at least a day. She was discovered by a neighbor and taken to the emergency department for an initial evaluation before her placement.
in foster care. Autumn has been in 3 foster homes since. Autumn is currently not receiving any medications and is not known to have any chronic illnesses. Her immunizations are up to date.

Autumn is the first and only known child in her family. Her father's name is listed on the birth certificate, but the child welfare agency says he has been out of the house for more than a year. There have been multiple CPS reports concerning neglect, insufficient food, and lack of supervision. These began 18 months before placement in foster care. Autumn’s mother has not kept any medical appointments or court dates.

Clinic Visit

On her physical examination, Autumn was alert, clean, and well dressed. She appeared unhappy, not appearing to focus her gaze. Her vital signs were normal, and her height and weight were at the 25th percentile for age. Results of her general and anogenital examinations were normal.

Autumn said very little during her visit. She indicated that she was hungry and thirsty and stated that her “belly hurts.” When the nurse began to insert a needle to obtain blood work, Autumn started crying and screaming: “Don’t do that. That hurts like when my daddy hurt me with the knife. Daddy hurt my peepee.”

After Autumn had quieted down, we asked her to draw a picture of what she would like to happen to the person or thing that made her hurt. She drew a person with eyeglasses and stated: “I want him to go away.” When we asked her whom she had drawn, she said, “my daddy.” When asked about how she feels today, she drew an unhappy face and said, “sad.”

Case Discussion

Based on her presentation and clinic visit, Autumn’s problems can be divided into 3 main categories:

1. Previous home environment
2. Behavioral problems
3. Disclosure of sexual abuse

Our diagnoses for Autumn include physical and emotional neglect, posttraumatic stress disorder, and sexual abuse.

Objectives

In our case discussion, we would like to propose an explanation for (1) how a child exposed to neglect, or an unsafe home situation, a disrupted family, stress, trauma, and sexual abuse develops behavioral problems, (2) can have normal-appearing genitals on examination despite the history of sexual abuse, and (3) provide seemingly implausible disclosures of her father hurting her with a knife.

As part of this series, basic science principles will be our method of explanation. More specifically, we will use anatomy as our basic science. For simplicity, we subdivided our main question into 3 questions as follows:

1. Why does Autumn have behavioral symptoms?
2. Why does Autumn (who disclosed sexual abuse) have a normal genital examination result?
3. Is our acceptance of Autumn’s revelation of sexual abuse dependent on our acceptance of her story of penetration with a knife?

In the following discussion, we will present possible answers to these questions using anatomy as our main basic science.

“Why does Autumn have behavioral symptoms?”

Sexual abuse in children has various clinical presentations, which are both physical and behavioral. Physical symptoms include genital discharge or bleeding, sexually transmitted infections, and pregnancy. Behavioral presentations include changes in behavior, new fears, depression, anxiety, decrease in school performance, regression, sexualized behavior, night terrors, nightmares, enuresis, encopresis, running away, and posttraumatic stress disorder (PTSD).2,3

Posttraumatic stress disorder is a recognized complication of child maltreatment.4 Studies have shown varying prevalence rates of PTSD.4 This may be due to individual characteristics of children, the samples being studied, and the lack of standardized measures.4 In children in foster care, 64% of those who had experienced sexual abuse had PTSD, and 42% of those who had experienced physical abuse fulfilled the PTSD criteria. Moreover, 18% of the children who were not abused also met PTSD criteria because they had witnessed violence.5

There are recognized criteria for diagnosis of PTSD in adults (Table 1)6; however, there are no
Children develop PTSD when they are exposed to a traumatic event that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others. In children, the response to the event may include disorganized or agitated behavior. It may take the forms of repetitive play in which themes or aspects of the trauma are expressed, frightening dreams without recognizable content, and trauma-specific reenactment.

Children’s diminished interest may be observed by caretakers but not reported by them. They may also develop somatic symptoms, such as headaches and stomach aches. Normal development of children is expected to be more disrupted in the cases of ongoing familial abuse than after a single traumatic event because abuse and neglect often occur over time.

Autumn clearly demonstrated symptoms of PTSD. She was exposed to sexual abuse and neglect, both of which are traumatic and threatening, and

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### Table 1. Criteria for Diagnosis of Posttraumatic Stress Disorder

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<tr>
<th>Criteria</th>
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<tr>
<td><strong>A.</strong> The person has been exposed to a traumatic event in which both of the following have been present:</td>
<td>1. The person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others. 2. The person’s response involved intense fear, helplessness, or horror.</td>
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<td><strong>B.</strong> The traumatic event is persistently reexperienced in 1 (or more) of the following ways:</td>
<td>1. Recurrent and intrusive distressing recollections of the event, including images, thoughts, or perceptions. 2. Recurrent distressing dreams of the event. 3. Acting or feeling as if the traumatic event were recurring. 4. Intense psychologic distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event. 5. Physiologic reactivity on exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event.</td>
</tr>
<tr>
<td><strong>C.</strong> Persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (not present before the trauma), as indicated by 3 (or more) of the following:</td>
<td>1. Efforts to avoid thoughts, feelings, or conversations associated with the trauma. 2. Efforts to avoid activities, places, or people that arouse recollections of the trauma. 3. Inability to recall an important aspect of the trauma. 4. Markedly diminished interest or participation in significant activities. 5. Feeling of detachment or estrangement from others. 6. Restricted range of affect.</td>
</tr>
<tr>
<td><strong>D.</strong> Persistent symptoms of increased arousal (not present before the trauma), as indicated by 2 (or more) of the following:</td>
<td>1. Difficulty falling or staying asleep. 2. Irritability or outbursts of anger. 3. Difficulty concentrating. 4. Hypervigilance.</td>
</tr>
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<td><strong>E.</strong> Duration of the disturbance (symptoms in Criteria B, C, and D) is more than 1 month.</td>
<td>7. Sense of a foreshortened future.</td>
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<tr>
<td><strong>F.</strong> The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.</td>
<td>1. Difficulty falling or staying asleep. 2. Irritability or outbursts of anger. 3. Difficulty concentrating.</td>
</tr>
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</table>

**Specify if:**
- Acute: if duration of symptoms is less than 3 months.
- Chronic: if duration of symptoms is 3 months or more.

**Specify if:**
- With delayed onset: if onset of symptoms is at least 6 months after the stressor.
her response involved fear and agitated behavior. She persistently experienced the events in the form of nightmares. She avoided being left alone with her foster mother’s husband to avoid similar conditions in which the abuse occurred. Autumn also appeared to be detached, with little interest in activities and a restricted range of affect. She had symptoms of increased arousal, with difficulty falling asleep, and outbursts of anger. Her symptoms occurred for at least a month and caused clinically significant distress and impairment of social interactions. It appears that Autumn meets the criteria of diagnosis of PTSD. How did she develop PTSD, and how can anatomy explain her presentation?

Because the brain is the anatomic site of processing experiences and controlling behavior, did structural changes occur in her brain as a result of abuse and neglect? To try to explain the resulting behavior, one has to imagine the brain as composed of 2 matters: the grey matter composed of cells and nuclei metabolizing glucose and the white matter composed of the tracts and fibers that connect different grey matters together. The anatomic part of our brain dealing with emotions and behavior is the limbic system. The limbic system controls emotions, memory formation, mood, and hormonal secretions and is itself composed of both grey and white matter.

It has been proposed that child maltreatment, more specifically neglect, affects the anatomy of the grey and white matter of the limbic system. Studies done by Chugani et al proposed that early global deprivation of institutionalized Romanian children may result in persistent specific cognitive and behavioral deficits. Neuropsychologic assessment of Romanian orphans showed mild neurocognitive impairment, impulsivity, and attention and social deficits. The study showed significantly decreased glucose metabolism bilaterally in areas of the limbic system on positron emission tomography (PET) scanning compared with healthy children in areas that belong to or are associated with the limbic system. The hypometabolism of glucose in these areas may indicate dysfunction in brain regions that result from the stress of early severe socioemotional deprivation and may be associated with the cognitive and behavioral deficits that were manifested by the Romanian orphans.

Another study using the diffusion tensor imaging (DTI) technique was done by Eluvanthingal et al to study the white matter of the limbic system. The DTI was used to study the white matter because it does not metabolize glucose like the grey areas of the brain. Thus, the PET scan could not be used to study and visualize those tracts. Children who experienced socioemotional deprivation showed a structural change in the left uncinate fasciculus (Figure 1) that may partly underlie the cognitive, social and emotional, and behavioral difficulties that commonly are observed in these children. The uncinate fasciculus is the major fiber tract (white matter) connecting the inferior frontal and anterior end of the temporal lobe. In summary, the white matter of the limbic system is affected in cases of stress and is anatomically smaller compared with healthy children.

Our attempt is not to prove or generalize the results of the above studies, especially since they were conducted on a small number of patients. It is, however, important to realize that the anatomy of the brain is affected by stress and maltreatment and can possibly explain the behavioral changes resulting from child maltreatment, including PTSD.

To summarize, it is possible that the stress to which Autumn was exposed could have affected the limbic system, which in turn could explain her behavioral symptoms.

“Why does Autumn (who disclosed sexual abuse) have a normal genital examination?”

Examination of the female genitalia requires visualization and proper documentation of the developmental stage (Tanner), labia minora and majora, clitoris, clitoral hood, periclitoral folds, urethra, periurethral folds, hymen, perihymenal sulcus, posterior fourchette, vagina and cervix (selectively), perineum, and anus to internal sphincter (Figure 2). It is important to keep in mind the normal anatomic variations of female genitalia are affected by the developmental stage and age and even vary among girls of the same developmental stage and age. In infants, the hymen is circumferential and redundant, the preschool girl has a hymen that is thin with rudimentary labia minora, and the child in early puberty has a thickened hymen with developing labia minora. To summarize, the female genitalia in normal children may appear differently (Figure 3). Heger et al reported findings in 2384 children referred for possible sexual abuse, and the result of the
Figure 1. The uncinate fasciculus overlaid on T1-weighted magnetic resonance imaging scans coregistered to the diffusion tensor imaging images. A, Left uncinate fasciculus in a normal child. B, Right uncinate fasciculus of the same normal child. C, Left uncinate fasciculus in a socially deprived child (note the thinner and poorly organized tract). D, Right uncinate fasciculus of the same socially deprived child. Reproduced with permission from the American Academy of Pediatrics.10

Figure 2. Genital and anal anatomy drawing and report form. Reprinted with permission from the American Academy of Pediatrics.3
genital examination in 95.6% of children reporting abuse was normal. Most children, even with history of penetrating trauma, had a normal or nonspecific result on the examination. The result of the genital examination could be normal in cases of sexual abuse because:

1. the nature of the sexual assault may not be damaging,
2. the perception of "penetration" may be in error,
3. disclosure may be delayed weeks, months, or years,
4. complete healing can occur without visible residua, and
5. the hymen develops as puberty progresses, masking injuries.

"Is our acceptance of Autumn's revelation of sexual abuse dependent on our acceptance of her story of penetration with a knife?"

Autumn disclosed that her father abused her with a knife; however, her physical examination showed no signs of injury or healing. Although it is possible that abuse with a knife could have happened, such an occurrence would be extremely unlikely. However, the probability that this event did not occur exactly as described does not necessarily discredit the allegation of sexual abuse. Children's accounts of abuse sometimes do contain bizarre or impossible events, even in documented cases of abuse. These bizarre events are more prevalent in cases involving preschool children, multivictim, or multiperpetrator cases.

Everson et al summarized 24 different explanations that had been published in the literature for implausible elements in children's accounts of abuse. These explanations are a result of interaction of the developmental stage of the child with the abusive event, assessment process, and extrinsic influences. Three of those explanations pertain to Autumn's case: (1) traumagenic misperception/memory distortion, (2) misperception or miscommunication due to developmental limitations, and (3) attempts to assimilate novel events into existing schemes. We will attempt to explain in more detail each of these 3 possible explanations.

Traumagenic misperception/memory distortion. Because of Autumn's psychologic trauma, her implausible disclosure may be due to misperceptions of events because of high levels of emotional arousal, contamination of neural events by intrusions of traumatic...
memory fragments, and dissociative blocking of memory formation and subsequent errors in memory construction.¹³

Autumn may have experienced significant distortions of her auditory and visual perception due to her intense arousal and stress. Posttraumatic stress disorder may have resulted in Autumn having visual memories and flashbacks integrated inappropriately into neutral events resulting in misperception of these events. In addition, Autumn may be susceptible to suggestive influences from surrounding sources that result in further disruption of the integrity of her narrative memory.¹³

Misperception or miscommunication due to developmental limitations. At age 4, we expect a girl who has achieved her developmental milestones to have a fully intelligible speech, ask questions (eg, When? Why? and How?), and relate events. However, abuse is beyond a 4-year-old child’s ability to comprehend, which may affect Autumn’s capability to relate such disturbing events. Thus, Autumn is attempting to describe events beyond her developmental ability to understand and communicate. Her cognition is relatively immature, leading to her inability to perceive, communicate, and assimilate the event into her memory. She also has limited vocabulary and language skills as a 4-year-old child to explain accurately what happened.

Attempts to assimilate novel events into existing schemes. Memory is an active process of organizing new information into preexisting mental schemes constructed from past experience.¹³ These preexisting schemes determine the extent to which new information is absorbed and integrated.¹³ Distortions of this organization would likely occur in Autumn’s case because the event is completely outside the realm of her cognition and experience.¹³ The physical sensation of pressure and pain by a pointed object elicits poking and painful schemata. For Autumn, the sexual abuse was with an object she felt was painful and pointed. For her, a painful and pointed object is a knife even if she did not see the knife. It would be helpful to ask Autumn if she saw the knife, where it came from, and how did she know it was a knife. However, at all times it must be remembered that unlikely, even bizarre, events may actually occur; therefore, it is possible that the perpetrator could have used a knife.

Management

Appropriate medical management for Autumn should include a comprehensive medical and psychosocial interview and a detailed physical examination with special attention to the anogenital examination.¹⁴,¹⁵ A colposcope can be used for the anogenital examination because it provides a source of light and magnification to better visualize the anogenital structures and document findings with video recording or photographs.¹⁵

Another important point in our management of Autumn is to reassure her that she is “OK,” and is not to blame for what happened. She needs to know that what happened is not her fault, that she did nothing wrong, and that her body is normal.² Using the videocolposcope and allowing her to watch her anogenital examination on the monitor may further help in reassuring her that her body is normal.¹⁵

We need to provide body safety information, including proper names for her body parts, and introduce her to the “good touch, bad touch” concept.

It is mandatory to report her disclosure of sexual abuse to the CPS along with a detailed report of the interview, examination, and treatment recommendations. Reporting to CPS will also ensure that she remains in a safe and accommodative environment.³

Autumn will need psychotherapy for treatment of her PTSD. She may also need medications to modify her behavioral symptoms, including her fear and depressive symptoms. Cognitive behavioral therapy is an effective form of therapy for overcoming anxiety and depressive symptoms. Treatment may need 6 to 12 weeks or longer, with follow-up sessions depending on the severity of symptoms.

Conclusion

Autumn was neglected, sexually abused, and lived in an unsafe, stressful, and traumatic home environment. This may have affected the anatomy of the white and gray matter of her brain, more specifically the limbic system, leading to behavioral problems and possibly PTSD. She was sexually abused, yet the result of her anogenital examination was normal because it happened months before the disclosure, she healed with no scarring, and possibly did not have a penetrating injury. Her old and new memories are disrupted, and her words and language are limited, so what hurt her like a knife was reported.
to be a knife and thus was thought to be an implausible disclosure.

**Take-Home Messages**

Integrating basic sciences into our clinical world makes learning exciting and gives an interesting logical explanation to clinical symptoms of our patients. Our case elicits how intriguing common clinical scenarios could have explanations in basic sciences. Other important take-home messages are:

1. Multiple forms of abuse and neglect often coexist, and the presence of one form of child maltreatment should prompt the consideration of other forms.
2. Even with proven sexual abuse, most children have normal genital examinations.
3. Child maltreatment can have serious behavioral consequences.
4. History from the child is the single most important diagnostic feature in cases of sexual abuse.
5. Implausible disclosures may have several explanations.

Always consider the child’s developmental age, trauma, and stress in interpretation.

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**References**