Examining Communication and Patient Recall in a Family Medicine Residency

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Abstract

Background. Understanding key aspects of effective physician-patient communication could benefit residency education and improve patient comprehension of health information. Discrepancies between what physicians say and what patients understand can reduce quality of care (e.g., patient adherence and satisfaction), making it imperative to know when gaps in patient understanding exist. The objective of this study was to identify residents' efforts to assess patient understanding and the degree to which patients recalled information and instructions provided in the medical encounter.

Methods. Residents and patients were observed in routine medical encounters in a Midwestern family medicine residency center. Patients were surveyed immediately following the encounter for recall of information and recommendations from the encounter, satisfaction with physician communication, and health literacy.

Results. A total of 21 physician-patient encounters were observed. An inverse relationship was noted (Spearman's rho = -0.43, N = 21, p = 0.05) between number of topics discussed during the encounter and the percentage of information recalled.

Conclusions. Patient recall was related inversely to the number of topics covered by resident physicians. These results challenge physicians and medical educators to study and employ further those elements of physician-patient communication that enhance patient recall and understanding.

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Introduction

The Accreditation Council for Graduate Medical Education (ACGME) has identified effective physician-patient communication as central to the medical encounter, and includes "interpersonal and communication skills" as a core competency for residency education.[1] Physicians are expected to practice communication that results in the effective exchange of information and collaboration with patients. Effective communication between the physician and patient is associated with improved patient satisfaction and adherence.[2] A number of authors reinforce the need to enhance communication skills in the clinical training of physicians to mitigate problems such as physician use of medical terminology,[3,4] low patient understanding,[5] health disparities,[6] hospital readmissions,[2,7] and willingness to comply with recommendations following a hospitalization.[2]

Discrepancies have been found between what physicians say and what patients understand,[8] suggesting efforts are needed to enhance and verify patient understanding and recall. Such discrepancies are thought to result from a combination of factors including physician use of medical jargon and patient health literacy.[3,9] When physicians use medical jargon without

clarifying the information within a context that patients understand, patients are less likely to comprehend information, such as health status, lab values, and disease management options.[4]

Additional barriers to patient comprehension are present when patients have low health literacy. Functional health literacy has been defined as the "measure of a person's capacity to function in the health care setting as determined by literacy (comprehension of written health care materials) and numeracy (ability to understand and act on numerical health care instructions)."[10] Some of the problems associated with poor health literacy include incorrect medication usage, awareness of need for follow-up testing, and understanding of treatment side-effects.[3] Physicians need to assess patient understanding during each clinical encounter to ensure patients comprehend and can recall important health information.

Accurate patient recall has been studied with standardized patients, with an emphasis on "recall promoting behaviors" that physicians can use in practice, including ways of verifying understanding.[11] Yet, such "assessments of understanding" (AUs) can themselves be effective or ineffective based on the depth of response they encourage from the patient.[12,13] Farrell and colleagues[12] demonstrated a vast majority of AUs were hampered by such limitations as close-ended question format (e.g., "OK?"; "Any questions?") and/or failing to pause for patient response. The authors concluded that the attempts made by residents to assess understanding point to a need for feedback about how to be effective. For example, asking patients to restate recommendations from an encounter appeared to aid recall in primary care settings.[14]

As part of a Behavioral Science/Family Systems Educator Fellowship project for the Society of Teachers of Family Medicine, this pilot study sought to identify residents' efforts to assess patient understanding and the degree to which patients recalled information and instructions provided in the medical encounter. Additionally, patient health literacy and patient assessment of physician communication were collected to investigate possible conditions that might affect understanding and recall.

Methods

Participants. As a pilot study to understand physician-patient communication further, the study included a convenience sample (N = 21) of patients presenting for care at a Midwestern family medicine residency program. The study was approved by two local Institutional Review Boards. Inclusion criteria required that patients were 18 years or older, possessing adequate knowledge of English, with ability to provide informed consent, and who had a previous diagnosis of diabetes, hypertension, asthma, or depression. These conditions were selected because they represent common conditions treated by family physicians. Each participant received a $15 gift card.

A list of patients meeting the study criteria, with a scheduled appointment, was generated through the electronic medical record on a daily basis. Front desk staff was given a list of eligible patients at the beginning of each day, and those patients were provided an information sheet regarding the study upon check-in. A member of the study team was present in the waiting room to obtain informed consent prior to each clinical encounter. Post Graduate Year (PGY) 2 and PGY 3 resident physicians were recruited as primary care providers for the study (N = 9).

Physician communication measures. The ACGME emphasizes "interpersonal and communication skills" as a core competency for resident physician training.[1] A variety of

communication training strategies exist across family medicine residencies, including use of checklists, direct observation, standardized patients, and as is true in this residency, video review that assesses and critiques the effectiveness of communication of residents in their interactions with regular clinic patients.[15] For this study, physician-patient encounters were video recorded to observe and analyze physician communication. The video files were transcribed and investigators categorized and counted the types of information delivered to patients (e.g., providing information or advice), the types of recommendations they made for continued care (e.g., prescription medication, lifestyle change, referral to a specialist), instructions for follow-up, and attempts made to assess patient understanding. For example, the physician statement, "Verapamil may bring your BP down" would constitute an informational statement about medication. The statement, "Make sure you don't wipe it (medication) in your eyes or ears or anything" would be coded as an advice statement about medication. Follow-up statements refer to physician directions to the patient regarding future appointments, testing, or consultations/ referrals.

Assessments of understanding (AU) were coded based on the four types described by Farrell and Kuruvill[13] in a study of pediatric residents' counseling on newborn genetic screening. They included: teach-back, open-ended questions, close-ended questions, and "OK?" questions. Inter-observer agreement (IOA) was obtained among four independent raters (i.e., minimum of 80% agreement on codes) prior to coding and IOA was checked on 25% of the transcript analysis to ensure the agreement between raters. Each transcript was reviewed by two independent raters to summarize topical themes and communication categories.

Patient recall and satisfaction. Recall data were collected immediately following the patient encounter through a brief exit interview. Patients were asked to describe what the physician explained or wanted them to understand during the visit and what the physician asked them to do as a result of the visit. Each item recalled by the patient was compared to the transcript from that encounter. Only those items recalled by the patient that matched information provided by the physician were counted as recalled information. The total number and type of statements recalled by patients was compared to the total number and type of information provided by the physician during the encounter to quantify patient recall of information.

To understand the rate of patient recall in comparison to patient satisfaction with physician communication, patients were asked to complete the Communication Assessment Tool (CAT)[16] following the exit interview. The CAT is a 15-item, five-point rating scale (1 = poor, 5 = excellent), assessing patients' perceptions of the physician's communication skills during the encounter. Consistent with previous use of the CAT in resident communication,[16] one item about staff treatment of patients was omitted in analysis.

Patient health literacy data were collected through the short form of the Test of Functional Health Literacy in Adults (STOFHLA),[17,18] a 36-item measure in which participants fill in missing words from four multiple choice items while reading passages on healthcare.

Data analysis. To assess the level of patient recall from the exit interviews, resident communication during the encounters was coded as: information (e.g., regular exercise is an important component

of healthy living), advice (e.g., you should exercise 3-5 times per week for 30 minutes or more), or follow-up (e.g., we will need to recheck your blood pressure in one-week). Information and advice were designated further based on the content (e.g., blood sugars).

Nonparametric statistical tests were used, as normal distribution within the data set could not be assumed. A Mann-Whitney U test examined statistically significant differences in the proportion of information recalled when residents employed no AUs versus the use of one or more AUs. The total number of topics discussed during encounters was split by frequency into three subsets. The range for each subset was decided based on cut points for three equal independent groups. A Kruskal-Wallis test compared median encounter times and recall rates associated with each subset. The p-values were reported for each test. Spearman's rho correlation assessed relationships between the number of topics discussed and patient recall rates. Correlation data were reported as Spearman's rho and p-value. For all statistical tests, a p-value less than or equal to 0.05 was considered significant.

Health literacy (STOFHLA) scores were divided into three categories: inadequate health literacy (0 to 16 inclusive), marginal health literacy (17 to 22 inclusive), and adequate health literacy (23 to 36 inclusive).[17] Patient communication satisfaction (CAT questionnaire) data were analyzed by the mean score for each question and the frequency of ratings categorized as excellent.[16] Quantitative data were analyzed using Predictive Analytics Software (v.18.0, Chicago, Illinois; formerly SPSS).

Results

The majority of participants were non-Hispanic Caucasians (n = 12, 57%) and female (n = 15, 71%). The age range was from 27 to 77 years and the average age of respondents was 51.7 (SD = 15.8; Table 1).

Table 1. Demographic information for participants (N = 21).

	Frequency (%)
Gender	
Female	15 (71%)
Male	6 (29%)
Race	
Caucasian	12 (57%)
African American	9 (43%)
Other[a]	2 (10%)
Age Group	
≤ 30 years old	2 (9%)
31 - 40 years old	5 (24%)
41 - 50 years old	1 (5%)
51+ years old	13 (62%)

[a]Individuals who identified with more than one race.

Patient encounters. The mean time for each encounter was 16.86 minutes (SD = 6.76) ranging from 3.87 to 34.03 minutes in length. At least one AU was used during 52% (n = 11) of the resident-patient encounters. Only two types of AU ("OK?", close-ended) were used during the encounters. The median number of topics discussed per encounter was seven, and the median numbers of information, advice, and follow-up given were five, two and one, respectively. The mean patient recall rates for information, advice, and follow-up were 53% (n = 20), 57% (n = 16), and 66% (n = 18), respectively. The mean recall rate (N = 21) was calculated as 53%. The median patient recall rate among resident physicians who used no AUs was 47% and for those residents who use one or more AUs median patient recall was 58% (U = -0.65, p = 0.51). Additionally, no statistically significant differences (U = 0.56, p = 1.0) were found in the mean length of the encounters and

number of AUs (No AU vs. One or More AU).

The total number of topics presented during each encounter (range from 4 - 19) was divided into three subsets; less than 7 topics (n = 9), 7 - 11 topics (n = 6), and greater than 11 topics (n = 6). These subsets were used to compare mean differences in encounter time and proportion of topics patients recalled during the follow-up interview. No statistically significant differences in duration of encounter [$\chi^2(2, N = 21) = 5.48$, $p = 0.06$] occurred between groups.

A Kruskal-Wallis test comparing median patient recall rates associated with each subset of topics revealed no significant differences between groups [$\chi^2(2, N = 21) = 3.99$, $p = 0.14$]. Patients recalled a greater percentage of information when less than seven topics were discussed (60%) compared to 41% when more than 11 topics were discussed (Table 2). A scatterplot graph showed a trend for patient recall rates compared to number of topics discussed (Figure 1). An inverse relationship was noted (Spearman's rho = -0.43, N = 21, p = 0.05) between number of topics discussed during a patient encounter and the percentage of information recalled.

Table 2. Summary of recall rates for the number of topics discussed.

Number of Topics Discussed	Range	Patient Recall Rate* (Median Number of Recalled Topics)
< 7 Topics discussed (n = 9)	4-6	60% (3.0)
7-11 Topics discussed (n = 6)	7-11	55% (4.5)
> 11 Topics discussed (n = 6)	12-19	41% (5.0)

*[$\chi^2(2, N = 21) = 3.99$, $p = 0.14$]

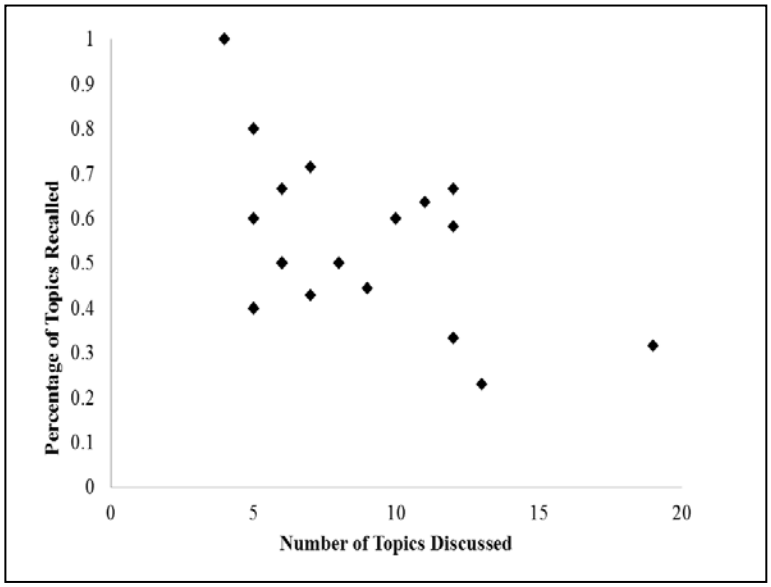

Figure 1. Relationship between number of topics discussed and patient recall. (Spearman's rho = -0.43, N = 21, p = 0.05)

All statements on the CAT were rated as excellent by over 60% of the respondents (N = 21; Table 3). The overall mean percent for "excellent" was 87% (SD = 0.24), and the overall mean score for the CAT was 4.82 (SD = 0.41). Items rated most frequently as excellent were "Dr. treated me with respect" (95%), "Dr. paid attention to me" (95%), and "Dr. gave me as much info as I wanted" (95%). The item rated as excellent the least number of times was "Dr. checked to be sure I understood everything" (67%).

Table 3. Summary of communication assessment tool responses[a] (N = 21).

	% Excellent	Mean	SD	Median
1. Dr. greeted me in a way that made me feel comfortable	90	4.9	0.30	5
2. Dr. treated me with respect	95	4.9	0.44	5
3. Dr. showed interest in my ideas about my health	81	4.8	0.54	5
4. Dr. understood my main health concerns	86	4.8	0.51	5
5. Dr. paid attention to me	95	4.9	0.22	5
6. Dr. let me talk without interruptions	90	4.9	0.30	5
7. Dr. gave me as much info as I wanted	95	4.9	0.66	5
8. Dr. talked in terms I could understand	90	4.9	0.48	5
9. Dr. checked to be sure I understood everything	67	4.6	0.59	5
10. Dr. encouraged me to ask questions	81	4.7	0.64	5
11. Dr. involved me in decisions as much as I wanted	86	4.7	0.90	5
12. Dr. discussed next steps, including any follow-up plans	90	4.9	0.30	5
13. Dr. showed care and concern	86	4.8	0.51	5
14. Dr. spent the right amount of time with me	81	4.8	0.54	5

[a]Responses were in the form of a 5-point Likert scale (1 = poor, 5 = excellent).

The majority of participants had adequate health literacy (n = 19, 91%), only two reported inadequate health literacy (n = 2, 9%). Three individuals (14%) did not complete the test within the prescribed seven-minute time limit, however, according to test instructions, their health literacy level was calculated and included in the results. No significant difference in health literacy among different races or genders was found (Fisher's exact test, p-values were 0.49 and 0.07, respectively).

Discussion

A substantial portion of information delivered during the patient encounters was lost immediately following the visit. Observed patient recall was 53%. Previous research reported an average patient recall range from 48-90%.[14,19-21]

Residents addressed a large number of topics during the observed clinical encounters, a practice that might have limited patient recall.[14] Even when a topic was covered briefly (e.g., your blood pressure today is 180), the overall quantity of information seemed to prohibit immediate patient recall. For example, one patient for whom more than 11 topics were addressed stated, "[The doctor] wants me to discontinue some medicines. I hope I'll get some paperwork on that because I don't remember which ones." The amount of information was related inversely to patient recall, which declined as the number of topics covered increased. However, the total number of recalled information increased as the number of topics covered increased.

The amount of information that a patient can recall may be limited by a ceiling effect.[22] This finding may suggest limiting the number of topics covered in appointments with the intent to improve patient recall, and is consistent with previous findings.[14] Such a conclusion poses a challenge for physicians in the current healthcare atmosphere whereby patients are encouraged to list all their complaints and questions ahead of a visit. An alternative might be to increase aids to understanding, an idea consistent with research by Farrell et al.[12] that the accumulation of data between each AU may be as indicative of recall rate as the total amount of information.

Residents in this study used zero AUs in 48% of the visits. When utilized, only those types of AUs the literature noted to be the least effective[8] (i.e., close-ended questions and "OK?" questions) were included. The minimal use of AUs and the use of "lower quality" AUs did not significantly improve patient recall. Given these results, it is noteworthy that the fewest "Excellent" ratings (67%) on the physician communication assessment tool occurred on the item, "Dr. checked to be sure I understood everything".

Scores from the STOFHLA denoted the majority of participants as having adequate health literacy. This finding is not supported by the current literature on health literacy since the underserved population in a residency practice often shares characteristics with those most at-risk for low health literacy, such as low income and low education levels.[23] It is possible that the tool is not sensitive enough to detect the literacy levels of this specific sub-group. Another possible explanation was that patients with adequate health literacy "self-selected" into the study. If that is the case, the recall rate in the follow-up interview is potentially even more telling, assuming greater health literacy would result in greater recall.[24]

Limitations. Discussion of these results must be framed within several limitations. This study was conducted with a small sample of patients and upper level residents at only one Midwestern residency. The convenience sample was not distributed equally among the nine residents, but was assigned based on resident availability in the family medicine center. These factors greatly limit the generalizability of results.

Secondly, patient recall was measured strictly according to self-report and by multiple researchers. Although written instructions were given to researchers for the sake of consistency, differences were noted in the time spent and the degree to which researchers persisted for recall information with patients. Recall data were collected immediately after the visit. Additionally, no effort was made in the analysis to determine

the level of importance given by residents to one type of information over another. All information, advice, and follow-up topics were counted equally. Assuming physicians emphasize some data more than others, this type of review could have been useful to determine whether patients recall information differently based on a different level of emphasis.

Future studies of this kind would benefit from random assignment of patients equally across residents, increased sample size and resident participation, and the use of educational videotaping sessions of physician-patient encounters as a source of research data so as to increase efficiency.

Strengths. Multidisciplinary collaboration (i.e., medical school researchers, family medicine faculty, resident physicians, behavioral scientist, and medical students) allowed for a rich diversity of perspectives throughout the process, including the understanding of results. Previous studies with residents' use of AUs were conducted with standardized patients.[13] This practice-based study allowed for examination of use of AUs during regular medical encounters between residents and their patients. While the study by Farrell et al.[12] noted a smaller proportion of encounters in which no AU was used (21% vs. 48%), standardized patients were trained not to give any non-verbal clues indicating a level of understanding. Such cues could make a difference in residents' use of AUs. This difference underscores the importance of evaluating resident-patient communication during clinical practice. Efforts should be made to observe resident-patient communication as a teaching strategy for improving resident communication skills.

Conclusion

This study emphasized the importance of studying, teaching, and employing those elements of physician-patient communication that enhance patient recall and understanding. The results challenge resident physicians to ensure that patients leave understanding the pertinent information and recommendations offered during the visit, either by prioritizing the information covered in medical encounters or by ensuring effective use of AUs during the encounter, or ideally by employing both. Future studies should assess resident use of AUs and other recall promoting behaviors (e.g., handouts, repetition, and patient restatement) following specific educational interventions to increase use of such behaviors. Measuring the impact of recall promoting behaviors on patient outcomes would strengthen the impact of such studies.

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A Modified CD-RISC: Including Previously Unaccounted for Resilience Variables

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Abstract

Background. Resilience is considered as the capacity to overcome adversity. Identifying psychiatric patients with lower resilience scores may assist mental health or other healthcare professionals in tailoring treatment to patients' needs. The original 25-item Connor-Davidson Resilience Scale (CD-RISC) has been used widely to measure resilience. However, the factor structure of CD-RISC in the original paper has not been replicated in subsequent studies. We sought to modify the original 25-item CD-RISC to achieve a stable factor structure.

Methods. The original 25-item CD-RISC was modified to include three new items, and most original items were revised for clarity and relevance for respondents, to achieve a more precise and accurate response. A few items were deleted based on empirically driven modifications. A total of 266 respondents were obtained from a university-based psychiatric outpatient clinic and hospital psychiatric outpatient clinic. An exploratory factor analysis was conducted.

Results. A four-dimension factor structure was identified using this data set. One item, "have to act on hunch" was deleted from the factor analysis due to weak correlation with the other variables. The instrument had excellent internal consistency (Cronbach's Alpha = 0.94).

Conclusions. The modified 27-item CD-RISC achieved a stable factor structure and high internal consistency, and generated a more interpretable result than the original CD-RISC.

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Introduction

Resilience is the ability to overcome adversity and to return to a person's previously established functional baseline.[1] The concept of resilience has been studied among different subsets of people, including the general population,[2] the elderly,[1] soldiers returning from active military duty overseas,[3] and individuals who, due to their line of work, are predisposed to post-traumatic stress disorder (PTSD) and/or other mental illnesses.[2-4]

The scope of what has been included in the term "resilience" has adapted as increased interest in the subject spurred research in various subject populations.[1,2]

Initially, resilience was defined as the ability to cope,[1] and it often was used inter-changeably with hardiness.[5-7] Maddi and Khoshaba[8] defined hardiness as a measure of mental health, however, they did not take into account dimensions beyond psycho-logical. Richardson proposed a biopsycho-spiritual model (encompassing mind, body, soul, and current life events),[2,9,10] whereas Connor and Davidson proposed a more biopsychosocial model (including trust in one's instincts, control, spiritual influences, and personal competency).[2,11]

The definition of resilience has evolved to encompass flexibility,[1] positive adapt-

ation,[11-12] the ability to thrive in the face of adversity,[2] and the ability to maintain function during stressful events.[11,13] Resilience is considered a multi-dimensional concept that varies among people and is influenced by characteristics such as gender, ethnic background, cultural background, and educational level.[2,14]

Resilience has a strong and direct impact on patient health. A high level of resilience is protective against mental illnesses such as depression and PTSD,[2-5,7,15] as well as physical illness,[15] and is associated closely with an individual's overall well-being.[2,7] Additionally, a definitive correlation has been made between increasing levels of resilience and an individual's ability to use learned skills to alter his or her environment, or perception thereof, to attain a higher level of functioning.[14] With this application in mind, measures have been taken to develop self-reported resilience scales with the goal of identifying individuals with lower than average scores and who, as such, may be at increased risk of negative health outcomes. The implication is that these individuals could be identified and targeted resilience-building strategies could be developed and implemented accordingly.

CD-RISC. In 2003, Connor and Davidson[2] published a resilience scale, "Connor Davidson Resilience Scale" (CD-RISC). Items included in the scale were selected through a search of resilience literature. The CD-RISC survey is comprised of 25 items that were deemed to be components of resilience. A higher score suggested an individual was more resilient. To validate the scale, Connor and Davidson distributed it to five populations: a non-help-seeking general population, primary care outpatients, psychiatric outpatients in private practice, participants in a study of generalized anxiety disorder, and participants in two PTSD clinical trials.[2]

Other studies of cross-cultural validity and factor analysis. The CD-RISC has been used and validated across several groups, including South African and Chinese adolescents, Korean students, firefighters, nurses, and Indian students.[16-19] In addition to being validated across various groups, these studies also looked at factor structure of the 25-item resilience survey. Though the studies conducted among Chinese adolescents and Korean students found that the five-factor model of the original CD-RISC was reproducible,[17-18] studies conducted in India, South Africa, Australia, and the United States did not concur.[16,19] The evaluation among Indian students confirmed four factors: hardiness, optimism, resourcefulness, and purpose.[19] Jorgensen and Seedat[16] were unable to reproduce the original factor structure using a sample of 701 South African adolescents, however, they identified three factors in their study: tenacity, adaptation, and spirituality.

In two studies, the original 25-item CD-RISC five-factor model was shown to be unstable.[11,20] In 2007, Campbell-Sills and Stein[11] inquired about the composition of the original CD-RISC. They found, via factor analysis, that the 25-item scale was not stable over two identical populations. Thus, they comprised a 10-item abbreviated version of the CD-RISC and established strong psychometric factors structuring the new format. In this study, hardiness and persistence were identified initially as two stable factors, and further manipulation allowed for the formation of a uni-dimensional factor.[11] Burns and Anstey[20] confirmed the uni-dimensional measure of the original CD-RISC. Furthermore, Vaishnavi et al.[15] comprised a CD-RISC 2 scale that was made up of only two items from the original 25-item scale: "Able to adapt to change," and "Tend to bounce back after hardship or illness" to reflect the meaning of resilience.

Purpose. As the concept of resilience is studied further and understood, it is important to incorporate factors that influence resilience into these existing instruments. It is also important to relate the questions to participants directly, so that the participant may answer appropriately and precisely. In this study, we proposed modifications to the original 25-item CD-RISC such as the use of first-person verbiage and the addition of items that were neglected in the original CD-RISC.

Methods

Instrument. The instrument, a modified version of the original 25-item CD-RISC, was designed to measure resilience. Three new items were added to the original 25-item instrument, which take into account aspects that are associated with resilience but were neglected in the original CD-RISC. Two items, "My family is willing to help me make decisions and listen to me" and "My friends are willing to help me make decisions and listen to me" were added to the modified scale to address the perceived support from family and friends. This was relevant as a higher level of social support is associated with increased resilience.[21] The question "I find my job rewarding" was added to the modified scale to assess job satisfaction, which symbolizes purpose and balance, both of which are associated with increased resilience.[21]

Additionally, "Coping with stress strengthens" and "In control of your life" in the original 25-item CD-RISC were removed, and replaced with "I feel obligated to assist others in need", and "I have few regrets in life", respectively. The feeling of assisting others in need is tied to the feeling of having purpose and meaning in life, both of which are factors associated with resilience not represented in the original CD-RISC.[22,23] Having few regrets in life is tied to problem-solving, another factor tied to resilience.[13,24] The benefit of the two items we added outweighed the benefit of the old items. The two old items ("coping with stress strengthens" and "in control of your life") were ambiguous.

Several of the original items were reworded so that the modified statements were all presented in the first person (Table 1). This change in verbiage prompted readers to identify themselves as active participants in the various items. For example, we reworded one item from "Able to adapt to change," to "I am able to adapt to change," allowing the reader to understand that she/he is intended to be the subject performing the action.

Like the original CD-RISC, the modified CD-RISC is a self-reporting scale in a Likert-type fashion. Each item was rated from "not true at all" (1 point) to "true nearly all the time" (5 points). The total number of points in the modified survey was 135. No identifiers were collected to ensure subject confidentiality.

Participants. In the original 25-item CD-RISC study,[2] the total number of participants (inclusive of all five populations) was 828; 577 patients were from the general population, 139 were from primary care, 43 were psychiatric out-patients in private practice, 25 were from a study of generalized anxiety disorder, and 44 were from two clinical trials of post-traumatic stress disorder (PTSD). This investigation studied general outpatient psychiatry patients recognizing that the participants of general outpatient psychiatry clinics comprised 5% of those in the original study. The current study increased the desired subject number to 266 to increase power.

To mirror the original Connor and Davidson's methodology,[2] the modified CD-RISC was distributed to two Midwestern general psychiatry outpatient clinics, a university-based psychiatric outpatient clinic

Table 1. Content of the Original Connor-Davidson Resilience Scale (CD-RISC) versus the Modified CD-RISC.

Item no.	Description	
	Original 25-item CD-RISC Items	**Modified CD-RISC Items**
v1	Able to adapt to change	I am able to adapt to change
v2	Close and secure relationships	I have close and secure relationships
v3	Sometimes fate or God can help	Sometimes fate or God can help
v4	Can deal with whatever comes	I can deal with whatever comes
v5	Past success gives confidence for new challenge	Past success gives me confidence for new challenges
v6	See the humorous side of things	I see the humorous side of things
v7	Coping with stress strengthens	I feel obligated to assist others in need
v8	Tend to bounce back after illness or hardship	I tend to bounce back after illness or hardship
v9	Things happen for a reason	Things happen for a reason
v10	Best effort no matter what	I give my best effort no matter what
v11	You can achieve your goals	I can achieve my goals
v12	When things look hopeless, I don't give up	When things look hopeless, I don't give up
v13	Know where to turn for help	I know where to turn for help
v14	Under pressure, focus and think clearly	Under pressure, I focus and think clearly
v15	Prefer to take the lead in problem solving	I prefer to take the lead in problem solving
v16	Not easily discouraged by failure	I am not easily discouraged by failure
v17	Think of self as strong person	I think of myself as a strong person
v18	Make unpopular or difficult decisions	I can make unpopular or difficult decisions
v19	Can handle unpleasant feelings	I can handle unpleasant feelings
v20*	Have to act on hunch	I have to act on a hunch
v21	Strong sense of purpose	I have a strong sense of purpose
v22	In control of your life	I have few regrets in life
v23	I like challenges	I like challenges
v24	You work to attain your goals	I work to attain my goals
v25	Pride in your achievements	I have pride in my achievements
v26		My friends are willing to help me make decisions and listen to me
v27		My family is willing to help me make decisions and listen to me
v28		I find my job rewarding

*v20 was not included in the statistical analysis of the modified 27-item CD-RISC survey.

and a hospital psychiatric outpatient clinic. The inclusion criteria for this study were: 1) 18 years of age or older, 2) an established patient of the clinic (the patient could not be a new patient establishing care at the clinic), and 3) proficient enough in English to complete the survey (as perceived by the support staff). The exclusion criteria were:

1) minors, 2) new patients to the clinic at their initial visit, 3) patients for whom a translator was needed, or 4) patients with whom a guardian was present due to age or decreased mental capacity.

Procedures. Receptionists at both out-patient clinics were instructed of the inclusion criteria and distribution instructions as they were the individuals responsible for appropriate delivery of the modified CD-RISC survey. Upon appointment check-in, the modified CD-RISC survey was distributed to every third patient meeting the inclusion criteria. The cover sheet included an invitation to participate in the study, a description of the research, contact information for the principal investigator, and the patient's right to decline participation at any time. Patients were offered access to the aggregate results upon conclusion of the study. Participants were not compensated for their involvement. Completed surveys were secured in a manila envelope and were collected from the clinics every Friday afternoon until the desired number of participants was obtained (approximately 24 weeks).

Statistical analysis. All statistical analysis was conducted using SPSS (Version 18.0) for Windows. Descriptive statistics were presented as means and standard deviations for continuous variables, and frequencies and proportions for categorical variables. An exploratory analysis was conducted to identify underlying factor structure of the modified CD-RISC. To achieve better interpretation of the factors, a direct oblimin rotation method with the Delta value of 0 was applied to the factor analysis.[25] A p-value less than 0.05 was considered significant.

Results

The study consisted of 266 adult patients from two private outpatient psychiatric clinics, Via Christi Psychiatry Clinic (n = 208, 78%) and the KU Wichita Psychiatry Clinic (n = 58, 22%). Most participants (n = 165, 62%) reported being female and between 36 to 64 years of age (n = 170, 64%; see Table 2). Most respondents (n = 221, 84%) identified themselves as Caucasians, 39% (n = 102) reported being married, and 38% (n = 101) reported having a high school diploma, GED, or less than high school level of education.

Item v20 (I have to act on a hunch) did not have a strong correlation with any other variables. The maximum correlation coefficient (r = 0.257) between v20 and any other variables was v18 (i.e., I can make unpopular or difficult decisions). Item v20 and v18 did not belong to the same dimension. Factor analysis was based on the correlation matrix among the variables. As such, v20 was eliminated from the factor analyses process.

The average resilience score using the remaining 27-item CD-RISC was 93.45 (SD = 19.55). Table 3 shows the average resilience score for each survey item. Females' average resilience scores were lower (mean = 91.87, SD = 18.70) than males (mean = 96.08, SD = 20.71). However, the difference was not statistically significant, $t(261) = -1.70$, $p = 0.09$.

An exploratory factor analysis was conducted to explore the underlying structure of resilience. Four factors were identified through the factor analysis. The overall variance explained by these four factors was 60%. Factor 1 reflected one's flexibility to cope with change and challenge; factor 2 can be explained as social and familial support; factor 3 can be explained as spiritual support; and factor 4 can be explained as having a goal-oriented life (Table 4). Internal consistency was evaluated by Cronbach's alpha, with a value of 0.94, demonstrating excellent internal consistency.

Table 2. Demographics of study participants.

Demographics		n	%
Gender	Female	165	62
	Male	99	37
	No response	2	1
Age	18-25 Years	75	28
	26-64 Years	170	65
	≥ 65 Years	19	7
Marital Status	Single	89	34
	Married	102	39
	Have a Significant Other	11	4
	Divorced	48	18
	Widow/Widower	7	3
	Other	7	3
Education Level	Less Than High School Diploma	22	8
	High School Diploma or GED	79	30
	Less Than 2 Years of College	52	20
	Associate's Degree	20	8
	2+ Years of College But No Degree	30	11
	College Degree	35	13
	Master's Degree	22	8
	PhD/MD/JD/Doctorate Degree	4	2
Race and Ethnicity	Caucasian	221	84
	Hispanic	6	2
	African American	29	11
	Native American	2	1
	Asian American	5	2
	Other	1	< 1

Discussion

Our study focus was to modify the CD-RISC survey, implement the new instrument with a general psychiatric population, and use the original CD-RISC study as the foundation. The original study had a relatively low number of participants for the psychiatric outpatient group compared to the number of participants in the modified study, which was composed exclusively of psychiatric outpatients. Gender and race of participants in the original and modified studies were similar (Table 5). The original CD-RISC study found the average resilience score among psychiatric outpatients was 68.0, SD = 15.3.[2] This result coincided with the average score in this study (61.63, SD = 17.09), with only the first 25 items being factored into the score. Moreover, the modified CD-RISC demonstrated a slightly higher Cronbach's alpha (0.94) than the original CD-RISC's result (0.93), which suggested an excellent internal consistency of the instrument. This modified 27-item CD-RISC maintained the excellent internal consistency, but offered some advantages such as including the three neglected items and clearer wording, allowing for greater interpretability.

Table 3. Summary table of modified 27-item CD-RISC survey.*

Items	Mean	Standard Deviation
v1 I am able to adapt to change	3.65	1.07
v2 I have close and secure relationships	3.78	1.21
v3 Sometimes fate or God can help	3.70	1.32
v4 I can deal with whatever comes	3.33	1.05
v5 Past success gives me confidence for new challenges	3.46	1.11
v6 I see the humorous side of things	3.74	1.07
v7 I feel obligated to assist others in need	3.89	1.02
v8 I tend to bounce back after illness or hardship	3.48	1.07
v9 Things happen for a reason	3.69	1.21
v10 I give my best effort no matter what	3.93	0.92
v11 I can achieve my goals	3.75	0.72
v12 When things look hopeless, I don't give up	3.50	1.00
v13 I know where to turn for help	3.87	1.12
v14 Under pressure, I focus and think clearly	3.08	1.07
v15 I prefer to take the lead in problem solving	3.15	1.11
v16 I am not easily discouraged by failure	3.10	1.02
v17 I think of myself as strong person	3.46	1.12
v18 I can make unpopular or difficult decisions	3.33	1.03
v19 I can handle unpleasant feelings	3.17	1.01
v21 I have a strong sense of purpose	3.27	1.14
v22 I have few regrets in life	3.09	1.24
v23 I like challenges	3.20	1.08
v24 I work to attain my goals	3.68	0.99
v26 My friends are willing to help me make decisions and listen to me	3.60	1.20
v27 My family is willing to help me make decisions and listen to me	3.73	1.23
v28 I find my job rewarding	3.16	1.36

*v20 (I have to act on a hunch) is not included in the summary table of the modified 27-item CD-RISC survey.

The modified CD-RISC instrument can be useful in assessing psychiatric patients' resilience as they manage diseases such as PTSD, depression, and anxiety.[2-4] Resilience quantification can be used in the clinical setting to identify individuals with below average resilience scores. Furthermore, resilience of individuals in treatment for PTSD, depression, and anxiety can be monitored throughout selected therapy, and alterations in therapy can be made based upon their 27-item CD-RISC scores. This type of instrument utility is reflective of the biopsychosocial model for treatment established psychiatric disease and was made possible by the addition of items regarding perceived social support and feelings of life purpose; both are important components that can be addressed in therapy.

Limitations. In our study, all patients were recruited through two psychiatric

Table 4. Factor analysis results of the modified 27-item CD-RISC survey.

	F1	F2	F3	F4
v19. I can handle unpleasant feelings	**.812**	.076	.088	.039
v18. I can make unpopular or difficult decisions	**.807**	.061	.141	-.014
v8. I tend to bounce back after illness or hardship	**.783**	-.130	-.266	.075
v4. I can deal with whatever comes	**.690**	.009	-.070	-.154
v1. I am able to adapt to change	**.667**	.164	-.018	.065
v6. I see the humorous side of things	**.619**	.245	.023	-.030
v14. Under pressure, I focus and think clearly	**.584**	-.146	-.129	-.245
v5. Past success gives me confidence for new challenges	**.497**	.103	-.026	-.353
v16. I am not easily discouraged by failure	**.388**	-.176	-.361	-.326
v12. When things look hopeless, I don't give up	**.387**	-.002	-.196	-.335
v27. My family is willing to help me make decisions and listen to me	.038	**.807**	-.113	.062
v26. My friends are willing to help me make decisions and listen to me	-.051	**.776**	-.116	-.110
v7. I feel obligated to assist others in need	.107	**.622**	.205	-.149
v2. I have close and secure relationships	.173	**.551**	-.319	.003
v3. Sometimes fate or God can help	.035	.095	**-.768**	-.058
v9. Things happen for a reason	.089	.148	**-.671**	.083
v13. I know where to turn for help	.184	.344	**-.355**	-.168
v23. I like challenges	.014	-.001	.176	**-.883**
v24. I work to attain my goals	.108	.155	.119	**-.737**
v25. I have pride in my achievements	.051	.170	-.046	**-.676**
v21. I have a strong sense of purpose	.081	.091	-.249	**-.537**
v22. I have few regrets in life	-.017	-.071	-.397	**-.537**
v11. I can achieve my goals	.183	.124	-.182	**-.519**
v15. I prefer to take the lead in problem solving	.418	-.009	.187	**-.454**
v17. I think of myself as strong person	.397	-.015	-.119	**-.407**
v28. I find my job rewarding	.128	.157	-.215	**-.397**
v10. I give my best effort no matter what	-.100	.209	-.298	**-.385**

Table 5. Demographics of original 25-item CD-RISC versus modified CD-RISC survey.

Demographics		Original CD-RISC**		Modified CD-RISC	
		n	%	n	%
Gender*	Female	510	65	165	62
	Male	274	35	99	37
Race	White	588	77	221	84
	Non-White	181	23	43	16

* Two respondents did not report their gender in the 27-item modified CD-RISC survey.
** Data were from the original 25-item CD-RISC by Conner and Davison.[2]

clinics, which may limit the generalizability of our findings to other populations. The vast majority of study participants were middle-aged Caucasians, a limitation shared in the original CD-RISC study. This study did not assess if participants had been undergoing short or long-term therapy (counseling or pharmacotherapy), or if participants were compliant or noncompliant with treatment. These unknown factors are important, because long-term therapy and compliance have been associated with higher resilience scores.[2,20]

Conclusions

When comparing the modified CD-RISC to the original 25-item CD-RISC, the modified version maintained the excellent internal consistency. In addition, the modified version includes three neglected items and is easier to answer in a truer sense, given that it is phrased in the first person. The modified 27-item CD-RISC performs better than the original CD-RISC for the psychiatric population. Using an instrument that accounts for factors of resilience supported by current research allows for a greater identification of resilience levels in psychiatric patients. As resilience is a concept of great breadth and depth, it is of the utmost importance to continue research into how to quantify resilience, especially among this population. Identifying psychiatric patients with lower resilience scores may assist mental health or other healthcare professionals in tailoring treatment to patients' needs, likely resulting in improved health outcomes.

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*Keywords***:** psychiatry, psychological resilience, factor analysis

Spinal Dural Arteriovenous Fistula with Bilateral Lateral Sacral Arterial Supply and Embolization

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Introduction

Spinal dural arteriovenous fistulas (SDAVFs), although rare (5-10/1,000,000), are the most common type of spinal vascular malformation.[1] They have a significant lag time in initial onset of symptoms to diagnosis with significant morbidity such as paraplegia and loss of bladder or bowel control. They are almost always treatable and preventable of progression upon diagnosis. SDAVFs usually arise from the thoracolumbar vertebral arteries, and rarely arise from the lateral sacral artery. We present a case of a spinal dural arteriovenous fistula arising from bilateral lateral sacral arteries with curative treatment from neuro-interventional radiologic embolization.

Case Report

A 75-year-old female presented to the emergency department for a chief complaint of progressive bilateral lower extremity myelopathy of four years with recent significant worsening. Over the course of four years, she reported progressive back pain, paresthesias, and bilateral lower extremity weakness necessitating the use of a cane progressing to needing a four-wheeled walker. She had become even weaker recently almost to the point of being unable to move her bilateral lower extremities as well as loss of bladder and bowel function.

Magnetic resonance imaging revealed numerous tortuous small vessel flow voids over the surface of the spinal cord as well as cord edema in the lumbar and thoracic spine (see Figure 1). Given the patient's history, these findings were representative of spinal dural arteriovenous fistula. The patient was transferred to the institution's main hospital for diagnostic angiography and possible intervention.

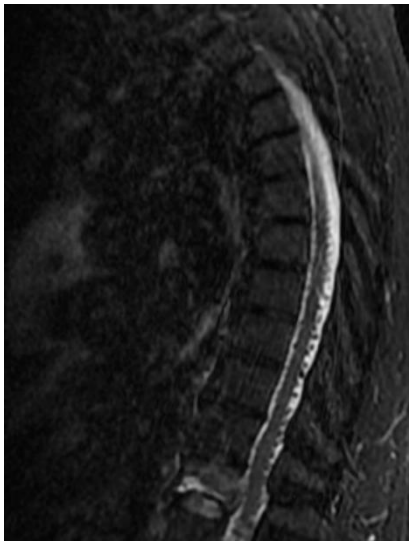

Figure 1. Saggital T2 Short TI Inversion Recovery (STIR) sequence displays cord edema together with perimedullary dilated vessels without intramedullary nidus characteristic of a SDAVF. Incidental note is made of vertebroplasty.

Catheter-directed angiography was performed in the neuro-interventional radiology suite with right femoral access (see Figure 2). Sub-selection and manual contrast injection of bilateral thoracolumbar vertebral arteries was performed. The artery of Adamkowitz was identified. The catheter was retracted to the level of the common right femoral artery and power contrast injection of 25 ml/sec for a maximum of 50 ml/sec was performed with contrast reflux into the aorta. A left lateral sacral artery supplied SDAVF ascending superiorly along the midline of the spinal canal was revealed.

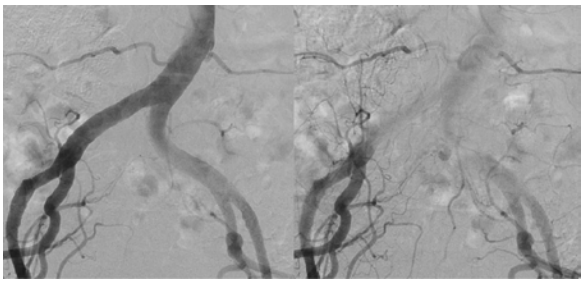

Figure 2. Left: Digital subtraction angiography (DSA) of pelvic angiogram shows an abnormal vessel arising from the left lateral sacral artery. Right: Delay DSA image of same run displays abnormal vessel not washing out with further superior extension.

The patient received catheter-directed embolization under anesthesia on the following morning. Microcatheter sub-selection of the left lateral sacral artery was obtained with re-demonstration of the SDAVF (see Figure 3). N-Butyl Cyanoacrylate Glue (NBCA) was mixed with opacification material and injected into the distal-most aspect of the left lateral sacral artery (see Figure 4). The catheter was retracted to the right common femoral artery and contrast injection was refluxed into the aorta. A subtle opacification of the SDAVF from a right lateral sacral artery feeding vessel was revealed (see Figure 5). Microcatheter angiographic sub-selection and glue injection of this artery was performed. A final run displayed no opacification of the SDAVF. The patient tolerated the procedure well. Over the course of the next few days, she regained her ability to ambulate and improved her bladder and bowel control.

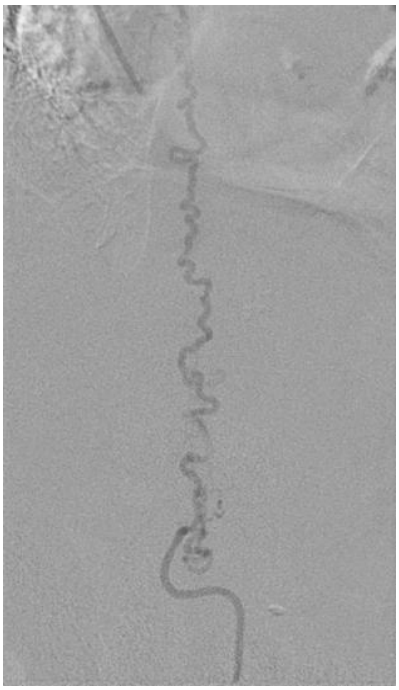

Figure 3. DSA image after sub-selection of left lateral sacral arterial malformation and subsequent contrast injection displays tortuous vascular anatomy over the location of the lumbar spine consistent with spinal dural arteriovenous malformation.

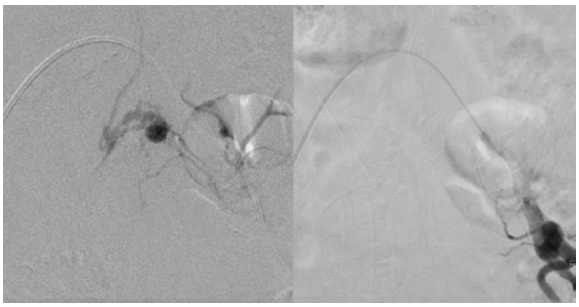

Figure 4. Left: DSA image of pelvis shows injection of opacification material mixed glue into the left lateral sacral feeding artery. Right: DSA run of same artery after glue release shows non-visualization of SDAVF consistent with technical success.

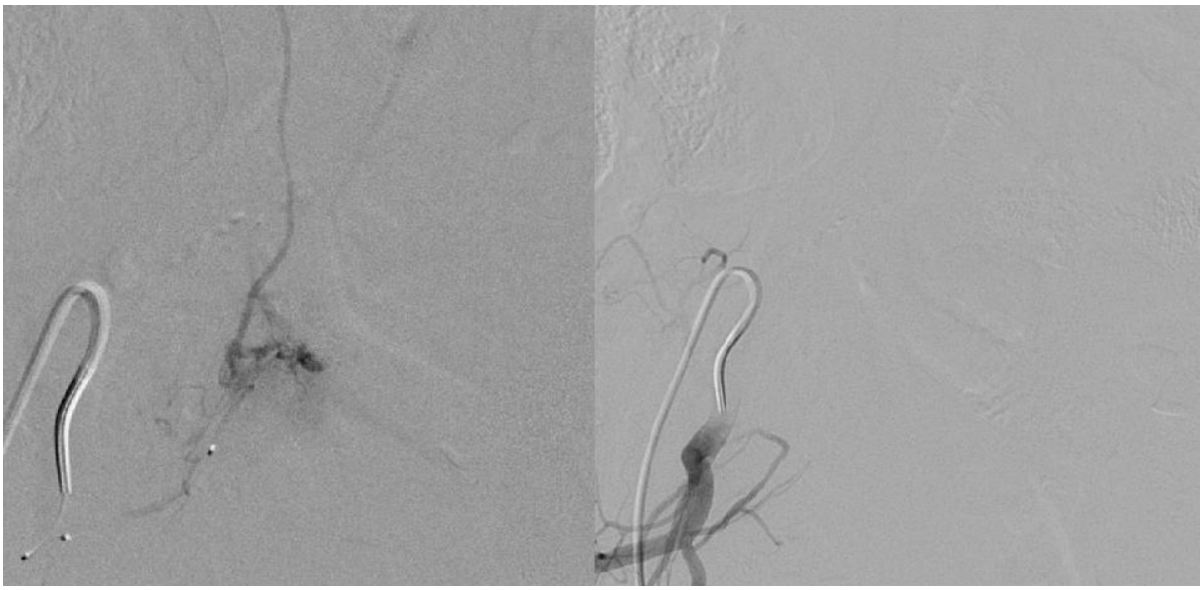

Figure 5. Left: DSA image shows contrast injection of right lateral sacral artery which displays additional feeding vessel to the SDAVF. Right: DSA image shows right lateral sacral artery contrast injection status post glue embolization which displays non-visualization of SDAVF consistent with technical success.

Discussion

Spinal dural arteriovenous fistulas are the most common vascular malformation of the spinal cord.[1-4] They account for approximately 80% of all spinal AV malformations. The underlying pathophysiology of SDAVFs is unknown, however, the pathology is usually the result of a radicular artery and vein that are abnormally connected. This abnormality usually occurs at the intervertebral foramen near the nerve root typically between L6 and T2 accounting for roughly 80% of all SDAVFs. Sacral SDAVFs accounted for only 4% of cases (5-10/25,000,000).[1-4] Sacral SDAVFs that have feeding arteries from bilateral lateral sacral arteries are rarer with less than 100 reported cases in PubMed.[4]

SDAVFs result in a congestive myelopathy with resultant neurological deficits.[5] As blood is shunted from the high-pressure arterial system to the inter-medullary venous plexus of the spinal cord, there is a reduction of the arterio-venous pressure gradient resulting in increased venous pressures and congestion of spinous veins. As a consequence of venous congestion, there is edema in the spinal cord. Furthermore, the congestion leads to decreased blood flow to the spine resulting in ischemic changes. If the ischemia is persistent and severe, irreversible cellular injury can occur.

The spinal cord edema and ischemia manifests clinically as neurological dysfunction with symptoms usually involving the lower extremity.[1,3,6] Symptoms typically begin with gait disturbances, paresthesias, and radicular pain. As the disease progresses, the motor and sensory disturbances become more severe. Additional symptoms can include bladder and bowel dysfunction, and erectile dysfunction. Three years following the onset of symptoms over 90% of patients were unable to walk.[3] It is imperative to treat patients early in their disease course to prevent the disabling symptoms of SDAVFs.

SDAVFs are delayed to diagnosis on average by 16 months.[3] Once diagnosed, the

treatment varies upon location and hospital preferences. Lesions typically are treated via endovascular techniques or surgical approach if the lesion is located near the spinal artery. These procedures are done under anesthesia to allow better visualization of the spinal artery, which depending upon location to the lesion, can be a contraindication to the endovascular approach. It also improves the ability to see residual fistula after embolization. Although open surgery may result in a higher cure rate than endovascular approach, the benefit to risk must be considered including longer recovery time, longer hospital stay, infection, and blood loss.

Our patient had a SDAVF arising from bilateral lateral sacral arteries with a four-year history of progressive bilateral lower extremity weakness. Over the next three days, our patient had marked interval improvement with strength returning to her lower extremities as well as improved control of bowel and bladder. Although rare, it is important to understand the presenting symptoms of SDAVF to prevent the long time to diagnosis as well as the fact that once diagnosed, via catheter-based embolization, it is a very treatable disease.

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Keywords: dural arteriovenous fistula, therapeutic embolization, angiography, interventional radiology, vertebral arteries

Mycoplasma Pneumoniae Requiring Mechanical Ventilation

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Introduction

Community-acquired pneumonia is a leading cause of morbidity and mortality with *Mycoplasma pneumoniae* (*M. pneumoniae*) accounting for up to 30% of all cases.[1-3] *M. pneumoniae* usually presents with a benign course. Fewer than 10% of cases are clinically apparent and fewer than 5% of those cases requiring hospitalization.[3-5] Of those requiring hospitalization, 10% will require admission to an intensive care unit (ICU) with mechanical ventilation as a result of Acute Respiratory Distress Syndrome (ARDS).

The literature presents cases where a previously healthy subject, between the ages of 18 and 37, progressed to ARDS and the associated severe complications.[4-8] Many of these cases presented for medical treatment after up to 10 days of non-specific symptoms such as fatigue, myalgia, and low- to high-grade fever. The majority of these cases received appropriate medical care, including antibiotic therapy, at time of presentation. However, disease progression continued and sometimes resulted in patient demise.

Theories explaining how *M. pneumoniae* infection can require admission to an ICU for a young, previously healthy adult rely on the host's immune response rather than the microbial agent.[3,9,10] The immune response mounted by the host, a delayed hyper-sensitivity with an associated excessive host-cellular response involving neutrophils, IL-2, IL-8, IL-12, IL-18, causes the damage to the lung parenchyma that results in ARDS. Due to this hypothesis, the addition of high dose corticosteroids in conjunction with the appropriate antibiotic coverage is successful in treating this subpopulation.[3,4,8]

We present a case in which the appropriate antibiotic coverage was insufficient to prevent the progression of respiratory distress. After the patient was intubated and admitted to the ICU, corticosteroids were added to the treatment regimen and the patient made a complete recovery.

Case Report

A 46-year-old woman with a 19-month history of seizure disorder, secondary to a closed head injury, presented with altered mental status for the preceding 24 hours. Home medications included valproate, levetiracetam, hydrocodone/acetaminophen, propranolol, and alprazolam. Social history was significant for tobacco use and a monogamous long-term sexual relationship. Recent history included a flight to Atlanta one week earlier to visit a hospitalized and intubated relative diagnosed with AIDS and lymphoma.

The patient arrived via emergency medical services (EMS) with a Glasgow Coma Scale (GCS) of 7 (Eyes 2, Verbal 2,

Motor 3). Associated signs and symptoms recorded by EMS included tachycardia (130 bpm), hypotension (70/36 mmHg), difficulty in breathing, productive cough for past four days, decreased appetite and oral intake, hypoglycemia (31 mg/dL), and four break-through seizures in the previous 24 hours. In the emergency department, the patient's vitals stabilized initially. Her oxygen saturation (O_2Sat) then decreased to 89% and subsequently to 79%, requiring BiPAP of 10 cmH_2O/5 cmH_2O with FiO_2 of 1.00 to return to 100% O_2Sat.

On physical examination at time of admission, the patient was unresponsive with sluggish pupils constricted to 1 mm and bilateral crackles upon auscultation of the lungs. The patient was in shock and resuscitation was started. A chest x-ray was obtained (see Figure 1a).

Laboratory testing revealed leukocytosis (20.6 x $10^3/mm^3$) with a predominance of neutrophils (86%). Other significant laboratory findings included elevated INR (1.39) elevated liver enzymes (AST 1045 U/L; ALT 569 U/L) and ammonia (164 µmol/L), and evidence of hemolysis (LDH 1344 U/L).

Initial treatment included naloxone, dextrose, dexamethasone, and normal saline bolus with improvement in the patient's mental status. Empiric treatment included trimethoprim/sulfamethoxazole, ceftriaxone, azithromycin, and nystatin. Samples were cultured and serology testing was performed. The results were negative for influenza A and B, *Streptococcus pneumoniae*, viral hepatitis A, B, and C, legionella, human immunodeficiency virus (HIV), cytomegalovirus (CMV), and *Pneumocystis jirovecii* (*P. jirovecii*). Only the serology tests for Mycoplasma IgM and IgG were positive.

On the second day, respiratory distress progressed despite antibiotic treatment. The patient was intubated and transferred to ICU with oxygen saturation less than 80% and respiratory rate greater than 50. The chest x-ray at this time is presented in Figure 1b.

On the fifth day of admission, her clinical presentation had not improved and high dose corticosteroids were added to her regimen. The patient's respiratory function improved and she was extubated on the seventh day of admission. The chest x-ray at this time is shown in Figure 1c.

The patient was discharged the following day with prescriptions for azithromycin for three weeks and tapered prednisone for two weeks. She was scheduled for a follow-up appointment one week later.

Discussion

This case highlighted the need to be aware of *M. pneumoniae* as an agent capable of causing a serious clinical picture. The patient presented as a medical resuscitation and that made many conditions more likely candidates than *M. pneumoniae* on the initial differential diagnoses. Suspicions of other causative agents mirrored the approach of others in similar instances.[6] Abnormal liver function tests initially were attributed to valproate use, but the values trended towards normal without discontinuation of valproate. Serum viral hepatitis titers also were negative suggesting the hepatitis was due most likely to the severe *M. pneumoniae* infection.[3,6] Elevated lactate dehydrogenase (LDH) suggested *P. jiroveci*, but sputum testing was negative and the patient was confirmed to be HIV negative. Elevated LDH has been reported in other cases of *M. pneumoniae* progressing to respiratory failure.[3] While elevated LDH and transaminase levels may be associated with severe *M. pneumoniae* infections, the contribution of multiple seizures and hemolytic anemia cannot be negated entirely. However, both of these clinical manifestations also were most likely the result of the *M. pneumoniae* infection.

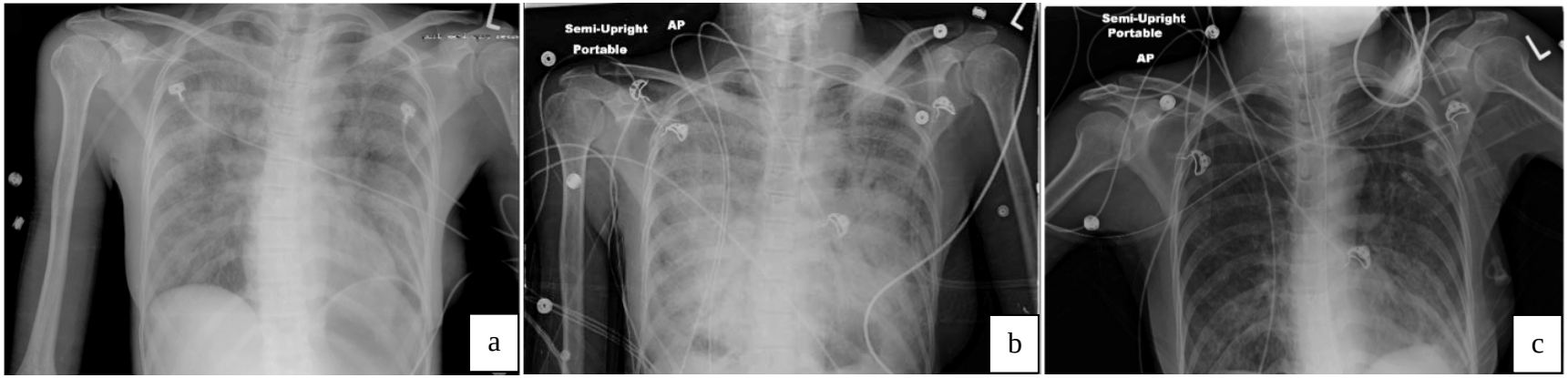

Figure 1. Patient chest x-rays: (a) At admission, diffuse bilateral ground glass opacities without focal consolidation; (b) On 2nd day, worsening diffuse bilateral ground glass opacities; (c) On 7th day, persistent left lower lobe patchy infiltrates with interval slight improvement in the left perihilar region and right lower lobe.

Currently, antimicrobials are the sole therapy for *M. pneumoniae*, but this case and those in the literature demonstrated they are not always sufficient to halt the disease progression and prevent the need for mechanical ventilation.[4,6-8] Animal studies have shown that early treatment with corticosteroids and antibiotics is crucial in the successful resolution of symptoms and prevention of fulminant pneumonia and death.[4,10]

Of the 13 cases of fatal *M. pneumonia* infection reviewed by Chan and Welsh,[4] only two patients may have received corticosteroids with antibiotic treatment. One patient received only one dose and it is questionable whether the second patient received corticosteroids at all. Interestingly, 8 of 26 patients with non-fatal respiratory failure received combination therapy.[4]

Other case studies reported this successful combination.[11] Daxboeck et al.[6] presented a fatal case of respiratory failure due to *M. pneumoniae* in which the clinical deterioration progressed despite the "presumable eradication of the pathogen itself." Chan and Welsh's review[4] noted four cases of "unusually severe" *M. pneumoniae* infection in immunocompromised adolescents for which the chest x-ray demonstrated minimal or no changes. Furthermore, these same patients made a recovery with antibiotic treatment alone. For our immunocompetent patient, the combination of antibiotics and corticosteroids led to improvements in her status when antibiotics alone did not halt the progressive respiratory failure.

In retrospect, there were other factors to consider with this patient. The multiple seizures preceding hospitalization could have contributed to the ARDS. Aspiration of stomach contents during a seizure is not necessarily common but has been documented to occur.[12] In our case, the sputum samples did not provide evidence of stomach flora and the chest x-ray did not show a focal consolidation. Chemical damage from aspiration was unlikely to be the cause of failure in our case, but should be a consideration in similar instances.

The seizure activity was interesting. The patient reported compliance with her valproate regimen and the laboratory results supported the claim. Neurologic complications of *M. pneumoniae* infection include both central and nervous system involvement[4,8,13,14] and it is possible that our patient's seizures were a manifestation of these complications.

On autopsy of a previously healthy 27-year-old woman who succumbed to ARDS secondary to *M. pneumoniae* infection, Tapyrik and Goldenberg[8] noted acute hemorrhagic leukoencephalitis (AHLE). One of the fatal cases of respiratory failure reviewed by Chan and Welsh[4] also demonstrated "multiple thrombi in leptomeninges" on autopsy and one of the non-fatal cases was noted to have "Guillain-Barre syndrome". Seales and Greer[13] presented a case of AHLE that occurred approximately seven days after the onset of *M. pneumoniae* infection. Their patient made a complete recovery with treatment including corticosteroids.

Our patient's anemia was not unusual. *M. pneumonia* has caused cold agglutinins and anemia even in mild cases of pneumonia.[15] While we did not have the data related to the patient's hematologic status prior to this case, we have reason to believe that her anemia was of new onset and hemolytic in nature. The size and hemoglobin concentration of the patient's red blood cells were within normal limits, but her LDH was elevated.

The final consideration is the judicious use of corticosteroids despite the demonstrated benefits with complications such as ARDS and AHLE.[3,4,8,13] Time is of the essence with evidence to suggest that the

sooner corticosteroid treatment is initiated, the better the clinical outcome will be.[3,4,8,10] However, care must be taken to insure the appropriate antibiotic treatment continues as the immune response is suppressed to prevent further damage to the lungs and nervous system. This is of utmost importance for patients who are intubated for mechanical ventilation as they may be at an increased risk of acquiring a nosocomial infection.[16] The index of suspicion should be high as there is evidence that identifying a nosocomial infection in an ICU patient is difficult at the best of times.[17]

Conclusion

M. pneumoniae infection often does not require hospitalization or antibiotic treatment but our patient presented an example where hospitalization, ICU admission, and mechanical ventilation were all required. Antibiotic treatment alone was insufficient to halt the progression of the respiratory failure. Clinical improvement and resolution occurred in the setting of combination therapy with azithromycin and high-dose corticosteroids.

Acknowledgements

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Keywords: mycoplasma pneumoniae, respiratory insufficiency, critical care, mechanical ventilation, acute respiratory distress syndrome

Mitomycin-Induced Pulmonary Veno-Occlusive Disease in a Patient with Carcinoma of the Breast

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Introduction

Pulmonary veno-occlusive disease (PVOD) is a rare cause of pulmonary arterial hypertension (PAH).[1,2] Despite being described over 70 years ago, PVOD is poorly understood and difficult to diagnose. PVOD is associated with connective tissue disorders, bone marrow transplantation, infection, sarcoidosis, and exposure to chemotherapeutic agents including mitomycin, bleomycin, and carmustine.[1] It is characterized by intimal and medial fibrosis of the pulmonary venules and veins of the lobular septa. We present a case of a patient with PVOD receiving mitomycin C for the treatment of breast cancer.

Case Report

A 73-year-old female presented with progressive dyspnea over six weeks. She had a twelve-year history of breast cancer treated with mastectomy, radiation, and multiple chemotherapeutic regimens including mitomycin. She also had a history of chronic obstructive pulmonary disease, trastuzumab-induced cardiomyopathy, and arthritis.

She was admitted for congestive heart failure (CHF) with hypoxemia, diffuse pulmonary infiltrates, and bilateral pleural effusions. She was diuresed and symptomatically improved. She was discharged home on three liters oxygen. However, her symptoms worsened despite diuresis and she presented again with progressive hypoxemia on her discharge oxygen. Her chest x-ray revealed diffuse bilateral infiltrates similar to her prior presentation.

On examination, she was afebrile with tachycardia, tachypnea, and oxygen saturation of 88% on three liters. Auscultation of the chest revealed bibasilar rales, but no jugular venous distension or peripheral edema was noted. She had bilateral Bouchard and Heberden's nodes with ulnar deviation of her hands. Her laboratory data did not reveal leukocytosis. A viral respiratory panel was negative and renal function was preserved.

On admission, a work-up of an alternative diagnosis to CHF ensued. A CT of the chest was performed (Figure 1). An echocardiogram confirmed normal chamber dimensions and systolic function with elevated pulmonary artery pressures. A right heart catheterization was performed (Table 1). The radiographic imaging combined with the pulmonary hypertension on right heart catheterization and exposure to mitomycin made the diagnosis of PVOD highly suspicious. Given her pulmonary hypertension and hypoxic respiratory failure, the risk of open lung biopsy outweighed potential benefits. She was treated with steroids and sildenafil, but eventually succumbed to her disease within three months of diagnosis.

A limited autopsy revealed intimal and medial fibrosis of septal veins consistent

with PVOD (Figure 2). There also was arteriolarization of pulmonary venules, some of which contained organized or recanalized thrombi. The adjacent lung parenchyma showed fibrosis with hemosiderosis with calcium encrustation. The pulmonary arteries and arterioles had thickened walls consistent with moderate pulmonary hypertension.

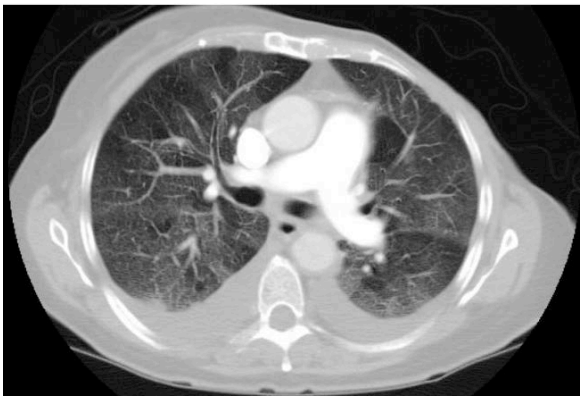

Figure 1. Small bilateral pleural effusions, right greater than left, was seen on CT of the chest with contrast. Patchy ground glass opacities were observed throughout the lungs bilaterally with upper lobe predominance. Interlobular septal prominence and mild dependent atelectasis also were noted.

Table 1. Right-sided cardiac catheterization measurements.

Systolic pulmonary artery pressure	56 mmHg
Diastolic pulmonary artery pressure	29 mmHg
Mean pulmonary artery pressure	38 mmHg
Pulmonary capillary wedge pressure	11 mmHg
Transpulmonary pressure gradient	27 mmHg
Pulmonary vascular resistance	7.8 wood units

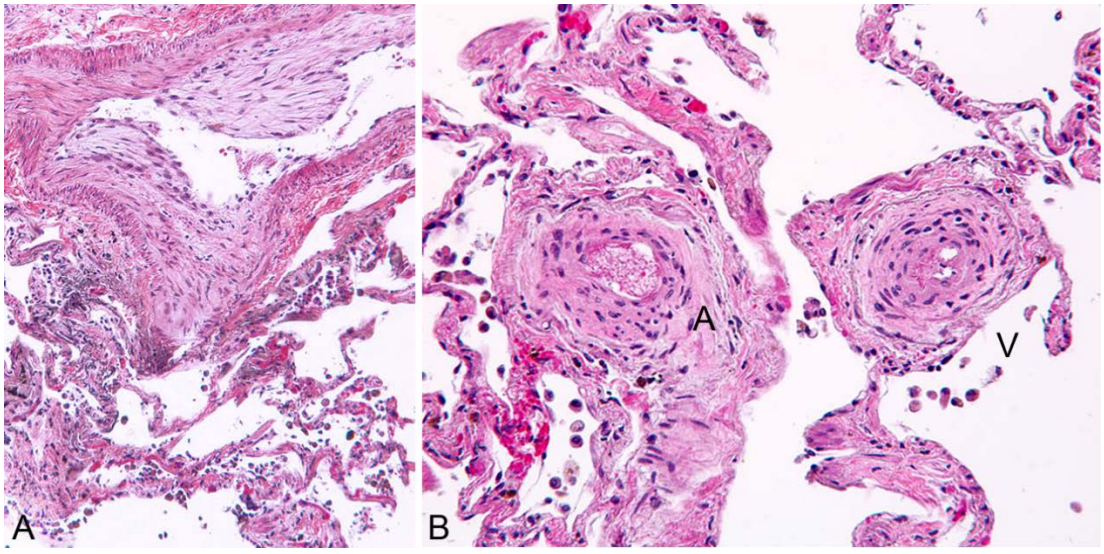

Figure 2. Pulmonary changes seen at autopsy: (A) Intimal and medial fibrosis of a septal pulmonary vein was observed. Fibrosis with bluish calcium encrustation and hemosiderin laden macrophages in the alveoli are seen adjacent to the vein. (B) Arteriole (A) is observed with a thickened wall and a narrowed lumen. Venule (V) has a recanalized thrombus in the lumen and thickened wall consistent with arteriolarization seen in PVOD. (Hematoxylin and eosin, (A) x160; (B) x220).

Discussion

The patient described above was on multiple anti-neoplastic regimens over a decade, but her symptoms started after receiving the fifth cycle of mitomycin therapy. Okuno et al.[3] described a range of 2 to 5 cycles of mitomycin therapy before development of PVOD. Definitive diagnosis of PVOD requires lung biopsy which can be risky in patients with severe pulmonary hypertension and hypoxemia.[4] The majority of cases are diagnosed clinically based on radiographic features and excluding other causes of PAH. The presence of two or three radiological abnormalities including lymph node enlargement, thickened septal lines, and centrilobular ground-glass opacities had a sensitivity of 75% and a specificity of 84.6% for the detection of PVOD.[2] The imaging in this case was classic for PVOD and autopsy confirmed the clinical diagnosis.[4]

Our patient had a long history of arthritis, but no formal diagnosis of rheumatoid arthritis. Interestingly, her rheumatoid factor and anti-cyclic citrullinated peptide levels were elevated, and perhaps connective tissue disease could be another factor contributing to development of PVOD.[5] This possibility could not be ruled out completely by autopsy as PVOD secondary to mitomycin and connective tissue disease have identical pathologic findings. Based on the temporal relationship in this case, mitomycin seems to be the likely etiology.

Treatment remains a challenge as exposure to pulmonary vasodilators used to treat PAH may precipitate acute pulmonary edema in patients with PVOD. However, phospodiesterase-5 inhibitors have been used successfully to treat PVOD, but no prospective studies exist and they should be prescribed only by someone with expertise in pulmonary hypertension and PVOD management. The use of steroids in PVOD has mixed results and lung transplantation is the definitive treatment.[2]

PVOD should be considered in cancer patients with hypoxia, diffuse infiltrates, pulmonary hypertension, and exposure to mitomycin**.** It is equally important to differentiate PVOD from other causes of PAH as standard therapy for PAH can be detrimental in PVOD. Although not an option for our patient, early diagnosis may allow for lung transplantation in a patient without contraindications to transplant.

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Keywords: mitomycin, pulmonary veno-occlusive disease, breast cancer, pulmonary arterial hypertension

Bronchial Carcinoid as a Cause of Hemoptysis

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Introduction

Carcinoid was first characterized by Lubarsh in 1888.[1] However, Ranson is given credit for the first description of a carcinoid of the ileum in 1890.[2] The term 'karzinoide' was used first by Oberndorfer in 1907 to describe tumors that behaved in a more indolent fashion than typical adeno-carcinomas.[3] In 1928, Masson stated that carcinoids should be considered as endocrine tumors since the malignant chromaffin or Kulchitsky cells in this disease exhibit amine uptake and decarboxylation characteristics.[4] In 1930, Kramer grouped carcinoid tumors with cylindromas as bronchial adenomas because of their good prognosis compared with bronchogenic carcinoma.[5] In 1972, Arrigoni and associates[6] designated a subset of carcinoid adenomas that were more aggressive as "atypical".

Bronchial carcinoid is a rare cause of pulmonary neoplasms accounting for about 1-2% of all pulmonary malignancies[7] and unique in the fact that it has neuroendocrine differentiation on histology. The incidence of carcinoid tumors varies with gender, age, and race. The overall incidence in the United States is estimated to be two cases per 100,000 people.[8] Carcinoid tumors often are diagnosed in a person's fifth or sixth decade of life. Except in appendiceal and broncho-pulmonary sites, African Americans have a higher incidence than other ethnic groups.[9] It is slightly more common in females (55% of all cases) than males.[8] Seventy-four percent of carcinoid tumors originated in the gastrointestinal tract; the second most frequent site was in the tracheobroncho-pulmonary tree with 25%.[8] Bronchial carcinoids have a relatively indolent course and good prognosis if treated, although they do have malignant potential,[10] therefore, it is important to recognize and treat them as soon as possible.

Case Report

A 46-year-old healthy Caucasian female presented to her primary care physician (PCP) two years prior for an episode of sporadic hemoptysis consisting of 1-2 teaspoons of bright red blood without symptoms of cough, fever, or chills. Laboratory studies and chest x-rays were done at the PCP's office and did not suggest any pathology. No further workup was done.

Two years later, she presented to the PCP's office again with two episodes of hemoptysis about one week apart. The patient did not have any systemic signs of anorexia, weight loss, fever, chills, cough, sputum production, or chest pain. Computed tomography (CT) of the chest showed a 17 x 19 mm nodule in the left perihilar region (Figure 1). She was referred to the pulmonology service because of recurrent episodes of hemoptysis and CT evidence of a nodule.

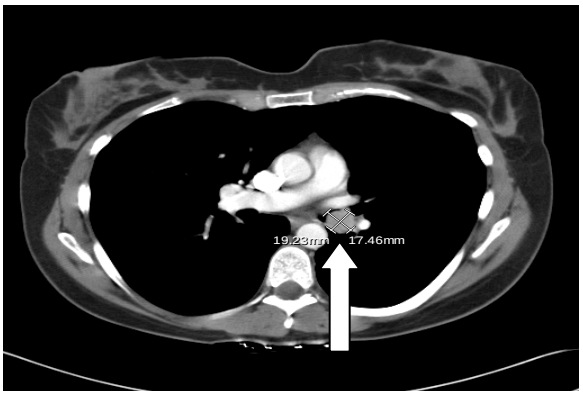

Figure 1. Chest x-ray shows a left perihilar 17 x 19 mass (arrow).

A flexible bronchoscopy was performed electively. During bronchoscopy, an obstructing lesion at the bifurcation of left bronchus was found (Figure 2). Endobronchial brushings and multiple biopsies from the mass showed cells to be consistent with carcinoid features with no pleomorphism (Figure 3) and staining for neuron specific enolase (NSE; Figure 4).

The patient subsequently underwent radiotherapy to decrease the tumor size and the sleeve resection of the tumor. The patient has been doing well since.

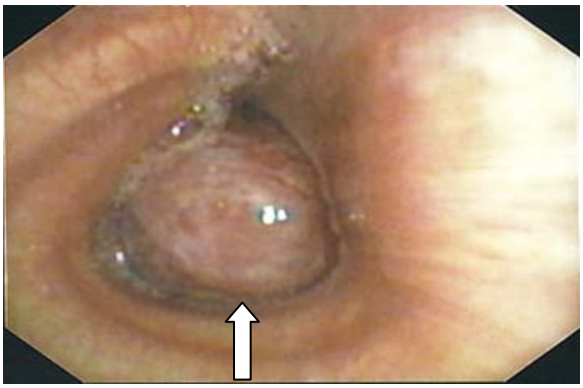

Figure 2. Bronchoscopy showed typical finding of a solitary intraluminal mass (arrow).

Discussion

Carcinoid tumors are derived from dispersed neuroectodermal cells. They are neoplasms of peptide- and amine-producing

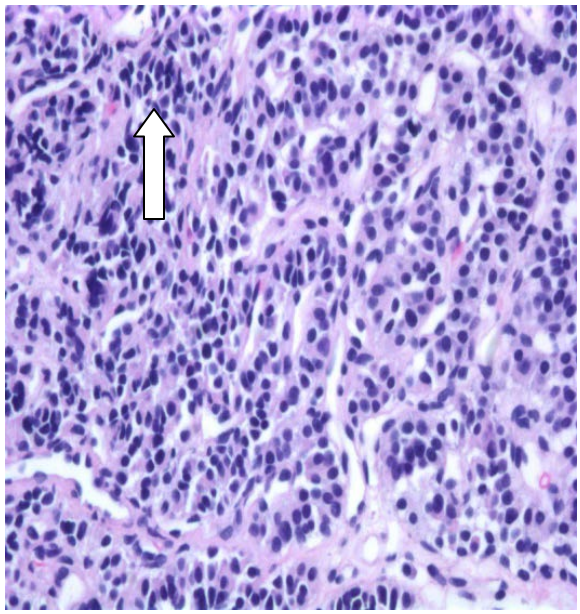

Figure 3. Pathology slide shows the carcinoid cell nests.

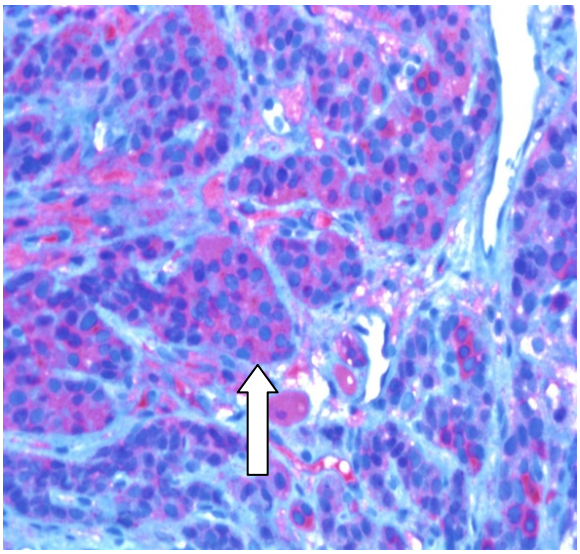

Figure 4. Positive staining is shown for neuron specific enolase.

cells, and their variable hormone profiles are based on the site of origin.[11] Carcinoid tumors can be divided into foregut derived, midgut derived, and hindgut derived.[9] Foregut carcinoids include those derived from the stomach, duodenum, thymus, and bronchus. Carcinoid syndrome is rare in foregut and hindgut derived tumors because the tumor cells of foregut and hindgut origin

do not have enzyme dopa decarboxylase to convert 5-hydroxytryptophan to serotonin. Carcinoid syndrome, if present, is atypical in these tumors. It is mainly the midgut derived which presents with typical carcinoid syndrome.

Bronchopulmonary carcinoid tumors account for approximately 25% to 30% of all carcinoid tumors.[5] The annual incidence rates of bronchial carcinoids are 0.52 and 0.89 per 100,000 population in males and females, respectively (the corresponding values for black males and females are 0.39 and 0.57, respectively).[5]

Pulmonary carcinoid tumors are thought to arise from Kulchitsky cells/neuro-ectodermal cells disseminated throughout the bronchopulmonary mucosa.[6] Histo-logically, bronchial neuroendocrine tumors are divided into four distinct histologic types. These include typical bronchial carcinoid, atypical carcinoid, large cell neuroendocrine carcinoma, and small cell neuroendocrine carcinoma.[12] Representing nearly two-thirds of pulmonary carcinoids, well-differentiated neuroendocrine tumors of the lungs and bronchi (typical carcinoids) are composed of cytologically bland cells that exhibit minor cellular atypia and rare mitoses.[12] Based on the 2004 WHO classification, these tumors must demonstrate fewer than two mitoses per 10 high power fields (10 HPF), lack necrosis, and be equal to or greater than 5 mm.[13]

Foregut carcinoids (including those arising in the lung) generally have a low serotonin content. This is because foregut carcinoids often lack aromatic amino acid decarboxylase and cannot make serotonin and its metabolites (including 5-HIAA). Although they can produce a variety of other peptides and hormones within the cell (gastrin releasing peptide, 5-hydroxy-tryptophan, and chromogranins), bronchial carcinoids only occasionally secrete bioactive amines. As a result, elevated plasma or urinary hormone levels rarely are detected. Serum levels of chromogranin A are sensitive but a non-specific marker, its levels being lower with bronchial carcinoids than with other neuroendocrine tumors. Measurement of serum CGA levels, however, can be useful to follow disease activity in the setting of advanced or metastatic disease.[14]

Bronchial carcinoids usually present in the fifth decade of life and demonstrate a relatively indolent disease course. Patients may present with recurrent pneumonia, cough, wheezing, hemoptysis, and chest pain.[15] Symptoms are highly variable and often present years before diagnosis. Cushing's syndrome occurs in 2% of patients; moreover, 1% of patients presenting with Cushing's syndrome have a pulmonary carcinoid tumor.[15,16] Acro-megaly from ectopic secretion of growth hormone-releasing hormone also has been reported in cases of bronchopulmonary carcinoid. Thus, ectopic secretion of biologically active hormones is not uncommon, as these tumors may secrete corticotrophin and growth hormone with relative frequency. However, carcinoid syndrome occurs in greater than 5% of patients with these tumors because of the relative paucity of serotonin secretion.[17]

Radiologically, most bronchial carci-noids present as abnormal chest x-ray with rounded or ovoid perihilar opacities. A CT scan provides better resolution of the tumor with regard to extent, location, and surrounding lymph nodes.[18] Extensive imaging is important for staging. Endosonography can be used to detect luminal lesions as small as 2-3 mm in size.

Bronchoscopic appearance is a pink or red vascular mass which is endobronchial with intact overlying epithelium.[19] They appear as smooth, cherry red, polypoid endobronchial nodules. Most bronchial carcinoids are in a central location within

reach of a bronchoscope. The histologic diagnosis is made with bronchoscopic biopsy. There may be massive hemorrhage following endoscopic biopsy due to the highly vascular nature of carcinoids.[20]

Surgical resection is the preferred treatment of bronchopulmonary carcinoid tumors in those patients with adequate functional pulmonary reserve. In patients with relatively small (less than 2 cm), localized tumors of the peripheral lung parenchyma, conservative resection via a wedge or segmental resection results in low recurrence rates and excellent long-term survival.[12,21] Tumors with extensive central bronchopulmonary involvement, those with large peripheral parenchymal involvement (> 2 cm), and atypical carcinoids may require more extensive surgical resection with a lobectomy or pneumonectomy.[12] Given the significance of nodal involvement in long-term prognostic models of pulmonary carcinoid disease, systematic radical mediastinal lymphadenectomy provides an advantage to all patients at the time of initial treatment.[22] There is no role for chemotherapy or radiotherapy in treatment of bronchial carcinoid. Palliative radiotherapy prior to surgical resection can be performed to decrease the tumor burden prior to resection.

Patients with pulmonary carcinoid tumors often have a good prognosis, with 5-year survival rates between 60% and 100% and 10-year survival rates between 40% and 100%.[23] Typical bronchial carcinoid tumors have the best prognoses with 5-year survival of 87 to 100%. Metastases from typical pulmonary carcinoids occur in approximately 12% of cases, and the overall survival rate is greater than 90%.[12]

The optimal post-treatment surveillance strategy is not defined. There is no consensus on what tests should be ordered. Most clinicians perform history and physical examination and chest CT annually for patients with resected typical carcinoid and every six months for resected atypical carcinoids for the first two years, then annually.[24]

Conclusion

It is important to keep bronchial carcinoid tumor in the differential diagnosis of a patient with hemoptysis who is a non-smoker and has no other risk factors for malignancy or infection and is otherwise healthy. Also, not all lung tumors have poor prognosis. Timely treatment can lead to normal life expectancy in an otherwise healthy patient.

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Keywords: bronchial carcinoma, pulmonary neoplasms, hemoptysis, case report

Use Caution in Draining Effusions in Patients with Liver Disease

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Introduction

Reexpansion pulmonary edema (REPE) is a rare, but well reported complication of pleural effusion[1] and a number of articles reporting hepatic hydrothorax with minimal ascites have been published.[2-6] To our knowledge, there are no reports of REPE occurring after therapeutic thoracentesis of hepatic hydrothorax in the setting of minimal ascites.

The development of hepatic hydrothorax is thought to be due to the passage of transudative fluid from the peritoneal cavity to the pleural cavity through diaphragmatic defects.[7] In the absence of ascites, rapid fluid shifts from the peritoneum to pleural cavity are thought to take place due to a combination of elevated intraperitoneal pressure and negative pressure in the pleural space resulting in hepatic hydrothorax with minimal ascites.[8]

We present a case with a rare presentation of hepatic hydrothorax complicated by both reexpansion pulmonary edema and pneumothorax.

Case Report

A 52-year-old female with a history of end stage liver disease (ESLD) presented to the emergency department with a chief complaint that she "could not get air." She reported a five-day worsening of shortness of air, dyspnea with minimal conversation, 4-pillow orthopnea, chest pain when laying supine, and a non-productive cough. She denied fevers, chills, and night sweats, but reported a significant weight gain of 15 pounds in the prior 10 days.

Her past medical history was significant for ESLD secondary to primary sclerosing cholangitis, portal hypertension, ulcerative colitis, and insulin dependent diabetes mellitus type II. She was hospitalized one week earlier for melena and anemia (hemoglobin 6.0 mg/dL) that required transfusion of four units of packed red blood cells. Endoscopy revealed only grade 1 esophageal varices. She denied alcohol, tobacco, or illicit drug use and family history was significant for lung cancer, liposarcoma, and colon cancer.

Vital signs included a temperature of 37˚C, blood pressure of 165/94 mmHg, pulse of 107 beats/min, respiratory rate of 22 breaths/min, and an O_2 saturation of 95% on room air. She was in mild respiratory distress; her sclera was anicteric. Heart rate was regular with a 2/6 systolic ejection murmur. Lungs were clear to auscultation on the left with no breath sounds and dullness to percussion throughout the right hemi-thorax. Her abdomen was soft, diffusely tender to palpation, and non-distended. Bilateral lower extremity edema was noted, cranial nerves were intact, and there was no asterixis.

A complete blood count was significant only for mild anemia with hemoglobin of 10.2 mg/dL. A comprehensive metabolic

panel revealed potassium of 3.2 mg/dL, total bilirubin 2.8 mg/dL, and albumin 1.3 mg/dL. Her calculated Model for End Stage Liver Disease (MELD) score was 14.

A chest x-ray showed a large right pleural effusion (Figure 1). Computed tomography (CT) of the chest and abdomen showed massive right pleural effusion and complete atelectasis of the right lung in addition to cirrhosis, portal venous hypertension, splenomegaly, mild peri-hepatic ascites, and gastroesophageal varices. Thoracentesis was performed and two liters of clear yellow fluid was aspirated and determined to be transudative by Light's criteria[9] with a pleural fluid/serum total protein ratio less than 0.5, pleural fluid/serum LDH ratio less than 0.6, and serum-to-pleural-fluid albumin gradient greater than 1.1. Due to the transudative nature of the fluid and the right-sided accumulation, the effusion was deemed likely hepatic hydrothorax.

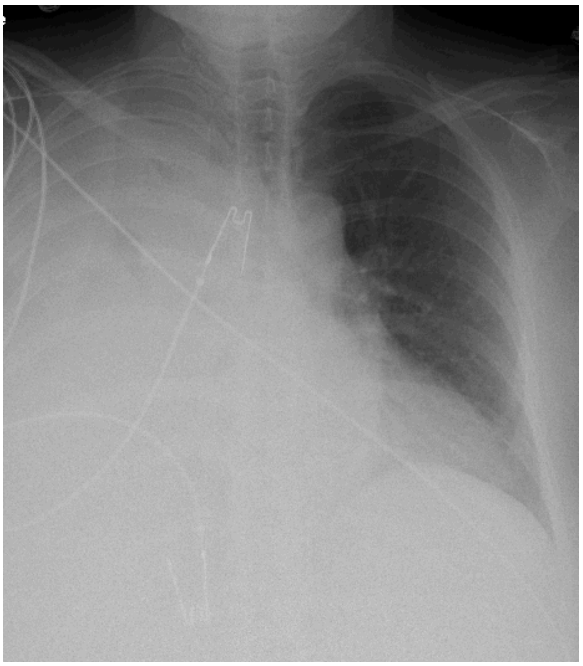

Figure 1. Right-sided pleural effusion.

Shortly after the procedure, the patient began coughing. A follow-up chest x-ray showed a right apical pneumothorax and the patient was started on 100% non-rebreather mask (Figure 2). Due to persistence of the cough and continued respiratory distress, another chest x-ray was obtained, revealing increased edema on the right upper lobe consistent with reexpansion pulmonary edema (Figure 3).

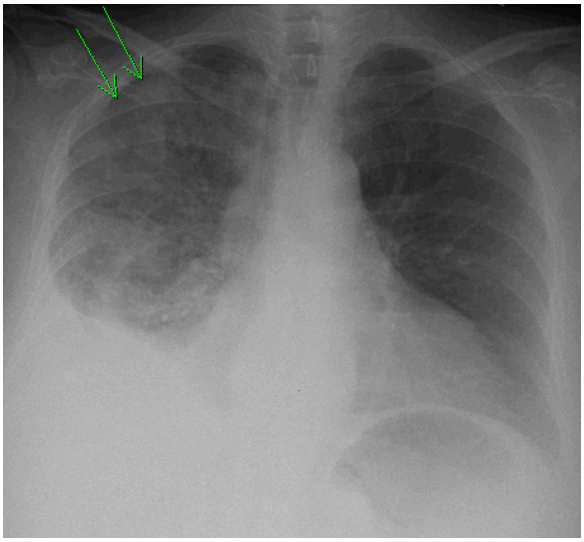

Figure 2. Development of small right apical pneumothorax status post thoracentesis.

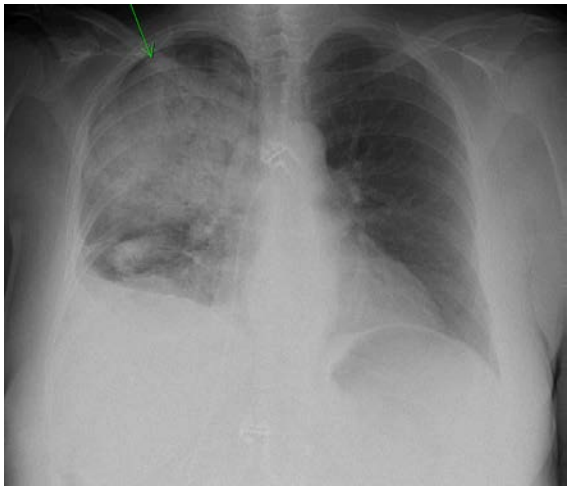

Figure 3. Development of reexpansion pulmonary edema (arrow denotes small residual pneumothorax).

The goal of management initially should be to control the formation of transudative

fluid. Therefore, the patient was started on furosemide and spironolactone, placed on 1.5 liter fluid restriction, and a two gram sodium restriction diet. Over the course of four days, serial chest x-rays showed gradual improvement with complete resolution of the pulmonary edema and pleural effusion (Figure 4). The patient was discharged to home in stable condition and able to ambulate with good oxygen saturations on room air.

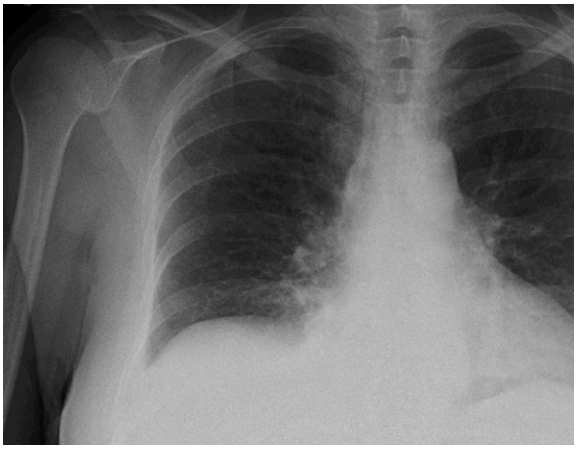

Figure 4. Resolution of pulmonary edema and pleural effusion after diuresis.

Discussion

There are situations in which the effusion is refractory to medical treatment alone. In these cases, serial thoracentesis is recommended. When thoracentesis is needed more frequently than every two to three weeks, alternative treatment options should be discussed.[10] While definitive treatment is orthotopic liver transplantation,[11] options including transjugular intrahepatic portosystemic shunt (TIPS)[12] and video-assisted thorascopy (VATS)[13] to repair diaphragmatic defects with and without pleurodesis have been identified as the best available "bridging" procedures for those awaiting transplantation.[14] Chest tube placement has long been considered a relative contraindication in the treatment of hepatic hydrothorax.[15]

Prevention of complications associated with thoracentesis is not well-known, given the different circumstances contributing to a pleural effusion. Pneumo-thorax is the most common complication.[16] Reexpansion pulmonary edema has been studied, and there are some potential prevention recommendations available, including taking into account the duration of time the effusion has been present, the presence of underlying lung disease, the pleural pressure, and the presence of symptoms while doing the thoracentesis.[17] In general, consensus appears to be that less than 1.5 liters should be removed, unless pleural pressures are used for guidance.

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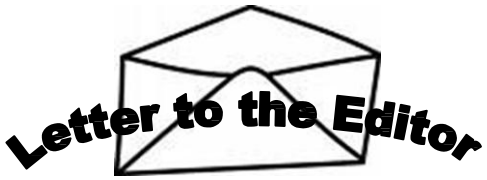
Keywords: pulmonary edema, pleural effusion, hydrothorax, pneumothorax



Erratum: Knowledge and Attitudes of Physicians in Kansas Regarding Domestic Minor Sex Trafficking

An error appeared in the November 2012 article, Knowledge and Attitudes of Physicians in Kansas Regarding Domestic Minor Sex Trafficking.[1] On page 152, reference number 11 was listed incorrectly as:

Hovath M. Human trafficking and the commercial sexual exploitation of children and youth in Kansas. Huffington Post. August 2, 2010. http://www.huffingtonpost.com/mark-horvath/human-trafficking-and-the_b_664567.html. Accessed January 15, 2011.

The correct reference is:

Countryman-Roswurm K. Kansas human trafficking and the commercial sexual exploitation of children and youth. In: Hovath M. Human trafficking and the commercial sexual exploitation of children and youth in Kansas. Huffington Post. August 2, 2010. http://www.huffingtonpost.com/mark-horvath/human-trafficking-and-the_b_664567.html. Accessed January 15, 2011.

We regret the error.

Sincerely,
Gina M. Berg, Ph.D.

Reference

[1] Reinhard A, Whitacre I, Hervey AM, Berg GM. Knowledge and attitudes of physicians in Kansas regarding domestic minor sex trafficking. KS J Med 2012; 5(4):142-153.