

A Missed Diagnosis: Instructor Guide

Title

A Missed Diagnosis

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Discipline

Biological Sciences

Target Audience

Intermediate, majors and nonmajors

Keywords

Anatomy, kinesiology, zygapophyseal joints

Length of Time/Staging

This problem may be presented in two parts, with each part requiring approximately twenty minutes of class time. In addition, approximately four to six hours of out-of-class library research would also be required.



Abstract

Susan presents herself to her family physician for a routine physical. During the physical examination Susan explains that she has been having recurring pain and slight muscle spasms (probably secondary to the pain) in her back and down into her left leg.

Susan is examined by her family physician, who makes an incorrect initial diagnosis. Following a lack of response to physical therapy and injections, Susan is referred to an orthopedic surgeon and a neurologist.

Students are asked to explain why the family physician made an incorrect initial diagnosis, as well as present a theory regarding a correct diagnosis. Students are also asked to answer several anatomically-related questions.

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4/27/2006

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9/10/2006

Student Learning Objectives

This problem was written with the following summative objectives in mind:

1. To understand the anatomy of the zygapophyseal joints.
2. To understand the concept of disc herniation.
3. To understand the anatomy of the formation of a spinal nerve.
4. To understand the anatomical relationships between intervertebral discs and roots of spinal nerves.
5. To understand the concept of dermatomes.
6. To understand the role of the cutaneous branches of the nerves of the lumbosacral plexus.
7. To understand the muscles innervated by spinal nerves of the lumbosacral plexus, with specific attention paid to the femoral, obturator, and accessory obturator nerves.

This problem was written with the following formative objectives in mind:

1. Increase overall problem solving skills, including the ability to define problems, gather and evaluate information, and develop solutions.
2. Develop effective knowledge acquisition skills.
3. Develop better team skills.
4. Increase communication skills.
5. Increase self-assessment skills.
6. Increase ability to assess the work of others.
7. Increase ability to identify, find and use appropriate resources.

Student Resources

Various Medical Dictionaries



Student's textbook

Gray's Anatomy REF QM23.2 .G73 2005

Professional Guide to Signs and Symptoms REF RC 69 .P77 2001

Atlas of Human Anatomy (Volumes 1 & 2) Sobotta REF QM 25 .S6313 2001

The Merck Manual REF RC 55 .M4 1999

Magill's Medical Guide REF RC 41 .M34 2002

Instructor Resources

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The Merck Manual REF RC 55 .M4 1999

Magill's Medical Guide REF RC 41 .M34 2002

Malanga, G., Memmo, P. Lumbosacral Facet Syndrome. (2004) Available from: emedicine.com (<http://www.emedicine.com/sports/topic65.htm>) Accessed 27 April, 2006.

Shin, C.H., Slipman, C.W., Ellen, M.I. Lumbar Facet Arthropathy. (2005) Available from: emedicine.com (<http://www.emedicine.com/pmr/topic68.htm>) Accessed 27 April, 2006.

Wheeler, A.H., Stubbart, J., Hicks, B. Pathophysiology of Chronic Back Pain. (2006). Available from: emedicine.com (<http://www.emedicine.com/neuro/topic516.htm>) Accessed 27 April, 2006.

Assessment Strategies

This problem has been utilized in Human Anatomy classes with an enrollment ranging from forty to eighty students. Assessment has been both summative and formative.

Summative Assessment:

Summative assessment has been broken down into two formats. One format involves evaluation of both the group and individuals within the group. The following procedure is followed in evaluating individual and group progress on the PBL:

On the day the PBL is assigned the class will break up into PBL groups and do some preliminary work on the problem. By the next class session each PBL group member must turn in an individual hard-copy preliminary report. The preliminary report must contain the

following:

- Possible hypothesis of the problem with the patient.
- What you will need to find out in order to prove or disprove your preliminary hypothesis, and where you will look to find this information.
- Any terminology that is not understood must be listed and defined, and the source of the definition cited.
- It is expected that each member of the group will review all of the group's preliminary hypotheses prior to coming to class the day the preliminary reports are due.

On the day the preliminary report is due the second part of the problem will be handed out. The class will again break into PBL groups and do further preliminary work on the problem. In this session the group will now:

- Determine how the additional information has changed any or all of the preliminary hypotheses, and why.
- Determine the course of action the group will take in order to solve the problem.
- Divide up the work that needs to be completed in order to solve the problem. The group leader will then post, in the group's Public Folder, a listing of which task is to be accomplished by which group member.

At the next class session (after distribution of part 2 of the PBL), each group member will turn in an individual hard-copy secondary preliminary report. (A copy will also be posted in the Public Folder). This secondary report must contain the following:

- Statement as to how your preliminary hypothesis of what is wrong with the patient has changed, and why.
- What you will need to find out in order to prove or disprove your newly formed hypothesis, and where you will look to find this information.
- Any new terminology that is not understood must be listed and defined, and the source of the definition cited.

As published in the course schedule, each group is required to submit a final report at the start of the appropriate class period. (It would be advisable for the group to keep at least one backup copy on computer disc.) The group report is to contain at least the following:

- Hypothesis of the solution to the problem.
- Sound anatomical reasoning to substantiate your hypothesis.
- Citations for any and all sources utilized, including your textbook.
- PBL reports will be graded on the anatomical accuracy of the final solution to the problem, as well as the anatomical logic utilized to arrive at the final solution.

A second form of summative evaluation is inclusion of material covered in the PBL on a "standard" lecture examination. The anatomical objectives may be assessed in the form of objective or essay questions.

Formative Assessment:

Formative assessment is accomplished two times during the course: at midterm and at the end of the course. Students are asked to fill out a form that assesses team and individual performance twice during the term. Individual growth throughout the term is assessed only at the end of the term.

Teaching Notes

- PBL Work Groups: Students will be randomly assigned to a PBL work group (see A to Z list attached to this course information sheet). During the first week of class each group is to meet and assign a PBL Work Group leader, and notify the professor, via e-mail, as to the name of the leader. The role of the group leader is outlined below.
- Four times during the term you will be assigned a PBL set. Each preliminary report is worth ten points (forty points for the term), and each secondary preliminary report is worth ten points (forty points per term). Each final report is worth 100 points (400 total points for the term). All problem set scores will be counted toward your final grade (i.e. lowest grade will not be dropped). Any student who is absent from class on PBL work days will not be given credit for that part of the problem set. It is the duty of the group leader to notify me of any member who is missing from class on PBL work days.
- The problems are designed in a format such that you will be required to seek out information beyond that provided to you in lecture.
- Each PBL group must choose a leader. The PBL group leader serves several important functions. Among these functions are:
 - **Facilitator of group meetings.** The group leader is the one member in the PBL group that is to contact other members of the group and arrange meetings to work on the PBL sets.
 - **Facilitator of group progress.** The group leader will coordinate, in conjunction with the members in his/her group, the tasks to be completed by each member of the group. The group leader is responsible for e-mailing the names of the group members who will be accomplishing each individual task to the instructor within 24 hours of the day that the final part of the problem is distributed.
 - **Facilitator of group problems.** The group leader is the individual responsible for participation of group members. If the group feels that it has a member that is not participating adequately it is the responsibility of the group leader to bring this to my attention. At this time the group leader, individual in question, and I will meet and try to facilitate the problem. If necessary a meeting with the entire PBL group will be held to facilitate the problem.
 - The group leader is responsible for turning in the final written, hard copy answers to the PBL sets as well as posting the final report in the public folder.

- Tasks that must be accomplished by group members are:
 - **Researchers:** These members (typically three for a PBL groups of six) are responsible for doing research on the presented problem. (Note: These are not the only members responsible for doing the research—rather they are the ones that will be responsible for coordinating the research and for doing the bulk of the research for the problem.) In addition, they are responsible for getting all information to the typists in a timely fashion.
 - **Typist(s):** This member (or members, depending upon the size of the report) is/are responsible for typing some or all of the final report for submission. The typist is responsible for getting the final draft to the editor in a timely fashion for initial reading.
 - **Editor:** This member works with other members of the group to determine what is, and isn't to be included in the final report. However, when a controversy develops, the editor has the final say.
 - **Copy editor (proofreader):** This member is responsible for proofreading the final copy and getting all necessary corrections back to the typists in a timely manner. The typists are then to make any and all necessary corrections, and get a corrected copy to the copy editor. When all corrections have been made, the copy editor is responsible for getting the final copy to the group leader for submission on the day the report is required.
- No group member may do the same task two problem sets in a row!
- On the day the PBL is assigned the class will break up into PBL groups and do some preliminary work on the problem in class. By the next class session each PBL group member must turn in an individual hard-copy preliminary report. (A copy will also be posted in the Public Folder). The preliminary report must contain the following:
 - Possible hypothesis of what is wrong with the patient (maximum of two pages in length, not counting bibliography).
 - What you will need to find out in order to prove or disprove your preliminary hypothesis, and where you will look to find this information.
 - Any terminology that is not understood must be listed and defined, and the source of the definition cited.
 - Citations for any and all sources utilized, including your textbook. All reports (both preliminary and final reports) must involve a minimum of three references. A minimum of two different text references must be used for each report (both preliminary and final reports). Your required lecture text may be one of these text references. It is advised that your second text reference be obtained from the reference section of the library.
 - It is expected that each member of the group will review all of the group's preliminary hypotheses prior to coming to class the day the preliminary reports are due.

- On the day the preliminary report is due, the second part of the problem will be handed out. The class will again break into PBL groups and do further preliminary work on the problem in class. In this session the group will now:
 - Determine how the additional information has changed any or all of the preliminary hypothesis, and why.
 - Determine the course of action the group will take in order to solve the problem.
 - Divide up the work that needs to be completed in order to solve the problem. The group leader will then e-mail to the instructor a listing of what task is to be accomplished by what group member.
- At the next class session each group member will turn in an individual hard-copy secondary preliminary report (maximum of two pages in length, not counting bibliography). (A copy will also be posted in the Public Folder). This secondary report must contain the following:
 - If your preliminary hypothesis has changed you must state how your preliminary hypothesis has changed, and why. However, if your preliminary hypothesis has not changed, then you must state how the additional information has supported and clarified your preliminary hypothesis.
 - What you will need to find out in order to prove or disprove your current hypothesis, and where you will look to find this information.
 - Any new terminology that is not understood must be listed and defined, and the source of the definition cited.
 - Citations for any and all sources utilized, including your textbook. All reports (both preliminary and final reports) must involve a minimum of three references. A minimum of two different text references must be used for each report(both preliminary and final reports). Your required lecture text may be one of these text references. It is advised that your second text reference be obtained from the reference section of the library.
 - A division of the work that needs to be completed in order to solve the problem, and who will accomplish each task. In addition to your listing of the group's division of labor in your secondary report, the group leader will then post, in the group's Public Folder, a listing of what task is to be accomplished by what group member.
- As published in the course schedule, each group is required to submit a final report (maximum of five pages in length not counting bibliography) at the start of the appropriate class period. (It would be advisable for the group to keep at least one backup copy on computer disc.) The group report is to contain at least the following:
 - Hypothesis for the solution to the problem.
 - Sound anatomical reasoning to substantiate your hypothesis.
 - Answers to all questions raised in parts 1 and 2 of the PBL.
 - Citations for any and all sources utilized, including your textbook. All reports (both preliminary and final reports) must involve a minimum of three references. A minimum of two different text references must be used

for each report (both preliminary and final reports). Your required lecture text may be one of these text references. It is advised that your second text reference be obtained from the reference section of the library.

- No late preliminary, secondary or final reports will be accepted.
- All material utilized in the construction of preliminary and final reports must be properly cited, both in the body of the PBL report as well as at the end, in a reference section, utilizing Council of Science Editors (CSE) Style. You may find additional information online at <http://library.osu.edu/find/resources/citation-examples/cse/> Additional information may also be obtained from A Writer's Reference at www.dianahacker.com/writersref or from a library.
- The CSE Manual provides models for documenting electronic journal articles and books, some of which are available on the World Wide Web and by FTP and gopher. The Council of Science Editors has established conventions for citing electronically published articles and books, and you are encouraged to follow them as outlined in the CSE Manual. When you cite other Internet sources, use the guidelines in this section. The examples shown follow the citation-sequence system, but you can easily adapt them to the name-year system by deleting the superscripts and alphabetizing the entries.
- List the References at the end of your research paper but before any appendices or explanatory notes.
- Listed below are a few citation examples:

- Book: Voet, D., Voet, J.G., and Thompson, R.T. 1990. Biochemistry.
New York: J. Wiley. p. 1223
In-Text: (Voet, Voet and Thompson, 1990)
or (Vote et al., 1990)
- Book Chapter: (or other part with different author)
Kuret JA, Murad F. 1990. Adenohypophyseal hormones and
related substances. In: Gilman AG, Rall TW, Nies AS, Taylor P,
editors. The pharmacological basis of therapeutics. 8th ed. New
York: Pergamon. p 1334-60.
In-Text: (Kuret and Murad, 1990)
- Journal Article: Johnson, D.L., Lynch, W.E., 1992. Panfish use of and angler
success at evergreen tree, brush, and stake-bed structures. N. Am.
J. Fish. Management. 12(1):222-229
In-Text: (Johnson and Lynch, 1992)
- Conference Paper: Meyer B, Hermanns K. 1985. Formaldehyde release from pressed
wood products. In: Turoski V. editor. Formaldehyde: analytical
chemistry and toxicology. Proceedings of the symposium at the
187th meeting of the American Chemical Society; 1984 Apr 8-13;
St. Louis, MO. Washington: American Chemical Society. p 101-6.

In-Text: (Meyer and Hermanns, 1985)

Electronic
Journal:

Slater, P.J.B., Jones, A.E. Timing of songs and distance call learning in zebra finches. *Anim. Behav.* [serial online] 1995; 49(2):123-248. Available from: OhioLINK Electronic Journal Center via the Internet (<http://journals.ohiolink.edu/etext/>)

In-Text: (Slater and Jones, 1995)

Wolf, B.B., Green, D.R. Suicidal tendencies: apoptotic cell death by caspase family proteinases. *J. Biol. Chem.* [serial online] 1999; 274 (20):20049-52. Available from: Journal of Biological Chemistry Website via the Internet (<http://www.jbc.org/>)

In-Text: (Wolf and Green, 1999)

- When citing web pages from the internet it is important to utilize the following general rules:
 - Provide the following information:
 - Author's name. (If not known, use professional site).
 - Date of publication or latest revision
 - Title of the document.
 - Title of complete work.
 - <URL, in angle brackets>
 - Date of access.
 - Provide sufficient information to allow a reader to locate the source you are citing.
 - Web documents share many of the elements found in print sources. The citation for a Web document often shares a format similar to that for print sources, with some information added and some deleted.
 - Cite what is available when you cannot find some elements of information about a source. For example, publication dates often are not provided.
 - Include the date that you accessed the source.
 - Cite the URL address accurately, and mark it in angle brackets < >. Include the access-mode (http, ftp, telnet, etc.). If it is necessary to divide the URL between two lines, break only after a slash mark and do not insert a hyphen at the break.
 - Citation example: Fronck, J. First basemen with shoulder pain and weakness. In PTP: Professional Team Physicians, Cases of Interest. Retrieved 23 July, 2002 from PTP Website:
 - <<http://www.proteamphysicians.com/article/index.asp?showarticle=yes&articleId=613&articletype=47>>
- Reference Resources:
 - A few titles to browse are:
 - *McGraw Hill Encyclopedia of Science & Technology* REF Q 121 .M3 2002
 - Various Medical Dictionaries found at REF R 121
 - *Gray's Anatomy* REF QM 23.2 .G73 1995
 - *Professional Guide to Signs and Symptoms* REF RC 69 .P77 2001

- *Atlas of Human Anatomy* REF QM 25 .N46 1997
- *The Merck Manual* REF RC 55 .M4 1999
- *Medical Guide* REF RC 41 .M34 2002
- *Professional Guide to Diseases* REF RT 65 .P69 2001
- *Current Medical Diagnosis & Treatment* CMDT REF RC 71 .C976 2003
- *Gross Anatomy in the Practice of Medicine* Slaby REF ZM 23.2 .S525 1994
- *Atlas of Human Anatomy* (Volumes 1 & 2) Sobotta REF QM 25 .S6313 2001
- All reports (both preliminary and final reports) must involve a minimum of three references. A minimum of two different text references must be used for each report (both preliminary and final reports). Your required lecture text may be one of these text references. It is advised that your second text reference be obtained from the reference section of the library.

Solution Notes

Solution removed.