

Harvest Time Danger: Instructor Guide

Title:

Harvest Time Danger

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Discipline:

Biological Sciences

Target Audience

Advanced, majors

Keywords

Anatomy, brachial plexus, glenohumeral joint, kinesiology, neuroanatomy

Length of Time/Staging

Two class periods (fifteen minutes in class per session) and two to four out-of-class sessions of one to two hours each.



Abstract

Tom, a 36-year-old, right hand dominant male farmer, is involved in a farming accident that involves his right upper appendage. The students are walked through a two-part problem that investigates the anatomy and kinesiology of the upper appendage, as well as the anatomy of the brachial plexus and the sensory innervation of the upper appendage.

Date Submitted

7/12/2005

Date Published

7/23/2005

Student Learning Objectives

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

1. Develop a better understanding of the anatomical structure of the glenohumeral joint.
2. Develop a better understanding of the general concept of a fracture, and the understanding of an avulsion fracture in particular.
3. Develop a better understanding of the anatomical structure of the rotator cuff, as well as the origins and insertions of the intrinsic and extrinsic muscles of the shoulder.
4. Develop a better understanding of the anatomy of the brachial plexus and its three-dimensional relationship to other structures within the shoulder.
5. Develop a better understanding of the components of the shoulder that contribute to, or limit ROM.
6. Develop a better understanding of the dermatomes of the upper appendage and their role in determining sensory innervation of the upper appendage.

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

Neuroanatomy through clinical cases by H. Blumenfeld (2002) Sunderland MA: Sionauer Associates, Inc. Publishers. (pp. 307-308)

The following resource describes the trauma in detail, and may be used as an instructor resource, but is not recommended to be made available to the students during the problem.



"Open inferior glenohumeral dislocation" by B.L. Davison and J.f. Orwin. *Journal of orthopaedic trauma* (1996) Vol. 10, No. 7, pgs. 504-506.



Teaching Notes

This problem has been conducted in a human anatomy class of approximately fifty, and a kinesiology class of approximately thirty. The methodology of delivery and assessment is labor intensive for the instructor, but it has been demonstrated to work very well during the time that I have been using PBL in the classroom.

Reviewer's comments and Author's responses regarding the revised submission are presented:

Reviewer: ... The case is interesting, and would draw in the students' interest. However, it lacks some detail that might help the students.

1. Needs better neurological description and localization of symptoms, where is paresthesia, is it dermatome associated or not.
2. Seems unlikely EMS would evaluate neurological deficits in the field. More on the shock aspect could be explored, and stabilization and immobilization of victim.
3. A description of the neurologist's evaluation and a psychiatrist's evaluation and how they would evaluate such an injury would strengthen the learning process. ie. What would be evaluated, what would be found and why.

Author:

1. A more complete neurological description has been included. However, a description of whether or not it is dermatome associated was not included.
Rationale: Four students that are working with me this summer on their senior capstone project (PBL construction and evaluation) evaluated the problem both ways, and felt that inclusion of the dermatome association would degrade the problem and point the students to the answer rather than having to research, discover and understand the dermatome association on their own. Based upon the student's evaluation this material was not included in the problem.
2. (Neurological evaluation in the field was revised.) Information about Shock was not included in the revised problem. Rationale: More inclusion on the shock aspect would point this problem more to that of an Anatomy & Physiology class. Such a revision (in the opinion of the author) would require a reduction in the difficulty of the problem. This problem is intended for an upper-division anatomy and/or

kinesiology class and not an A & P class. In addition, more information about the immobilization of the patient was viewed as being peripheral, and would not add to the content of the problem. The four students working on their senior capstone projects also felt that inclusion of his material would not (and did not upon reading the suggested revision with the material included) add to the quality of the problem. Indeed, two of the four students felt that the inclusion of the material was a detractor from the problem.

3. This material was not included in that this problem is intended for an undergraduate audience. Inclusion of such material could be added by individual instructors if such information was beneficial to the audience (*i.e.* PT or OT students, first-year medical students) for which the problem was intended (undergraduate anatomy and/or kinesiology students).

Assessment Strategies

This problem is an adaptation of a case entitled "Open Inferior Glenohumeral Dislocation" reported by B.L. Davison and J.E. Orwin in the *Journal of Orthopedic Trauma*, Vol. 10, No. 7, pages 504-506, 1996

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 what is wrong 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 what task is to be accomplished by what 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 state 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.

Solution Notes

Solution removed.