

# An Intervention Study to Reduce the Loss of Pathology Specimens

Avshalom Shalom MD<sup>1,2</sup>, Melyn Westreich MD<sup>1</sup> and Sharon Sandbank MD<sup>1</sup>

<sup>1</sup>Department of Plastic Surgery, Assaf Harofeh Medical Center, Zerifin, affiliated with Sackler Faculty of Medicine, Tel Aviv University, Ramat Aviv, Israel

<sup>2</sup>Plastic Surgery Unit, Meir Medical Center, Kfar Saba, Israel

**ABSTRACT:** **Background:** Loss of an excised lesion can have devastating clinical and legal consequences. Previously, the incidence of pathological specimen loss was 1/1466 (0.07%) due to failure to place pathology specimens in correctly labeled containers. We theorized that a strict protocol for handling specimens would help reduce losses.

**Objectives:** To devise a protocol to reduce the loss of pathology specimens.

**Methods:** In this study, 7105 specimens excised by one plastic surgeon were sent to the pathology laboratory using a strict protocol, which included: using a carefully labeled specimen container, inserting the specimen into the container immediately after excision (not at the end of the procedure), positioning the specimen container close to the surgical field during the surgery, and both the nurse and surgeon signing their names on the container at the end of the procedure to confirm the contents and labeling.

**Results:** One Mohs specimen was accidentally thrown away by a pathology laboratory technician after the frozen section report was written (an incidence of 1/7105, 0.00014%). All specimens arrived at the pathology department and no lesions were lost in the operating room.

**Conclusions:** A strict written protocol for specimen handling significantly reduces loss of pathology specimens.

*IMAJ* 2013; 15: 424–426

**KEY WORDS:** risk management, pathology specimens, surgical specimens, operating room protocol

## MATERIALS AND METHODS

A total of 7105 biopsy tissue specimens were obtained by one plastic surgeon (A.S.) in an outpatient clinic between May 2005 and September 2010. The control group for this study was the patient population of our previous study, from whom 4398 tissue specimens were obtained by the same plastic surgeon at the same outpatient clinic between October 2001 and April 2005. In both studies, all pathology specimens were inserted into a labeled plastic container containing buffered formalin 4% and sealed by a cap. A pathology request form including the patient's name, age, clinical data and clinical diagnosis was attached to each container. In addition, both the nurse and the plastic surgeon had separate logbooks documenting every biopsy specimen sent to the pathology laboratory. This created two separate systems for documenting the tissue biopsies – one managed by the doctor and the other by the nurse. When the pathology reports were returned, they were cross-checked against the two registration systems. The new strict explicit protocol added three new sub-protocols:

- The specimen was inserted into the container immediately after excision (not at the end of the procedure) with no unnecessary “stops” such that the specimen was placed on the operating table or the operative field
- The pathology container, labeled prior to surgery, was situated in close proximity to the surgical field during the procedure, either on the operating table itself, or conveniently close by
- At the conclusion of the procedure, the nurse and the surgeon both signed their names on the container label confirming that the correct specimen was indeed inside the correctly labeled container.

At the conclusion of the study, all surgical records and pathological reports were correlated and analyzed for any loss of tissue specimens. In both studies, if pathology specimens were reported lost, the container was returned to the clinic for confirmation of the loss by the surgeon. Patient details were compared between the different registration logbook systems

Loss of an excised lesion or tissue biopsy can have devastating clinical and legal consequences. In a previous study we showed that the incidence of pathology specimen loss was 1/1466 (0.07%). The most common cause was thought to be failure by the surgeon or the nurse to place the pathology specimens in a correctly labeled container [1]. We theorized that a strict protocol for handling tissue specimens would help eliminate this problem. After developing such a protocol we undertook this prospective study.

to ensure that the pathology specimen was actually obtained and sent. The pathology laboratory was asked to check that there were no unaccounted for containers or specimens on the date the biopsy was obtained. A formal investigation into all lost specimens was conducted. The chi-square test was used to compare the control group and the intervention study group

## RESULTS

There was a loss of one specimen – an incidence of 1/7105 (0.014%). In this one case, the material was not lost at the stage of excision and insertion. This was a case of a Mohs procedure where the central portion of the specimen reached the laboratory and indeed an initial pathology report of the frozen sections was made. However, the technician misunderstood and thought that once the pathology report of the frozen section had been rendered there was no further need for the specimen and threw it out; it was therefore unavailable for permanent section analysis. When we compared the control group to the intervention study group using the chi-square test, there was no statistical significant difference between the groups (1/1466 vs. 1/7105,  $P > 0.05$ ). When we calculated how many pathological specimens were saved during the intervention study period, the number was about 3.2 specimens.

## DISCUSSION

Surgical specimens may be lost between the time of excision and the time of insertion into the specimen container, during transfer of the specimen container to the pathology department, and in the pathology department. In our former study, we identified the critical point for specimen loss in the operating room to be the time of inserting the specimen into the properly labeled container by the surgeon or the scrub nurse. We assumed that in cases of specimen loss, the excised specimen was either forgotten on the operating table, thrown out by accident during the procedure, or never actually inserted into the container. These mistakes may occur if the surgeon or nurse is distracted or rushed, or asked to do a different task before the specimen is inserted into the container. Whatever the cause, there is no doubt that specimen loss is a result of human error.

We were unable to find any publications directly addressing loss of pathology specimens. However, there are articles discussing personal and organizational errors that deal with the problems of risk management and human error of this type [2,3] that guided us in the development of our protocol.

In the new protocol used in the present study, we attempted to overcome what we considered to be the critical time point for specimen loss: namely, the period during which the specimen is under the control of the surgeon and the operating team and must be inserted properly into a correctly labeled

container. In our previous study, it appeared that the lost specimens were either not inserted into the container or were accidentally thrown out. We theorized several scenarios in which a specimen might be lost:

- The specimen is transferred to the surgical table by the surgeon and forgotten because he/she is busy with hemostasis or some other aspect of the operation
- The specimen is on a surgical pad or scrap of paper in the surgical field and the nurse accidentally throws it out while tidying up his/her table
- Both the surgeon and the nurse forget the specimen on the table, failing to notice that they have not transferred it to the container and at the end of the procedure the specimen is thrown away
- During the transfer, it may appear that the specimen has been transferred to the container but actually still remains attached to the transferring instrument and thus never gets inserted
- The specimen is placed into an improperly labeled container or into the container of another patient.

We deduced that the best way to overcome this problem was to initiate a protocol in the operating room with an improved organizational system and precise written procedures. We added the following sub-protocols to the general specimen-handling protocol required in the operating room:

- The specimen container must be carefully labeled prior to the procedure
- The container is positioned in close proximity to the surgical field during the procedure so that the surgeon will be less tempted to place the specimen on the surgical field or scrub table
- The specimen is inserted into the container immediately after excision (not at the end of the procedure)
- At the end of the procedure, both the surgeon and the nurse must sign that the container is labeled correctly and that the specimen is in the container.

This study showed that all specimens reached the pathology laboratory, none having been lost in the operating room. The one case of specimen loss was due to technician error in the pathology lab itself.

As with all organizational problems and risk management, it is important to encourage reporting of errors or near errors in order to help identify core problems. Once these are recognized, the Ministry of Health or the hospitals can analyze the causes and come up with a more structured procedure for averting such errors. This mode of action creates a way of avoiding the problems along with a measure of flexibility to recognize and correct errors.

According to the Ministry of Health [4], the surgeon and the nurse are obligated to: correctly identify the patient, accurately document the anatomic localization of the lesion, and verify that the specimen is inserted into a container with a tightly sealed lid that is correctly labeled with the patient's details. A surgical specimen logbook should be used to ensure the accurate submission and follow-up of all specimens sent. By adhering to these rules and using a more detailed and strict administrative procedure of specimen handling, we have dramatically reduced specimen loss.

The Ministry of Health guidelines are too general and do not relate to the specific details of the process and its possible pitfalls. Our recommendations are based on in-depth research and experience of the entire process, as well as identification of the timing of insertion of the pathological specimen into the container, which is the possible weakest link in this complex process. In order to overcome this possible error point we devised specific recommendations: the specimen should be inserted immediately after its excision into the correct labeled container, and both the surgeon and the nurse must sign on

the container to verify the correct labeling and the presence of the specimen.

In summary, by using a strict, detailed and structured administrative protocol for handling tissue specimens, we dramatically reduced the rate of specimen loss in the operating room. We strongly recommend that all surgeons adopt these procedures.

#### Corresponding author:

**Dr. A. Shalom**

Plastic Reconstructive and Aesthetic Surgery Unit, Meir Medical Center, Kfar Saba 44281, Israel

**Phone:** (972-9) 747-1823

**Fax:** (972-9) 747-1319

**email:** fredricag@asaf.health.gov.il; avi\_shalom@hotmail.com

#### References

1. Sandbank S, Klein D, Westreich M, Shalom A. The loss of pathological specimens: incidence and causes. *Dermatol Surg* 2010; 36: 1084-6.
2. Reason J. *Managing the Risks of Organizational Accidents*. Aldershot, UK: Ashgate Publishing Ltd, 1997.
3. Reason J. *Human Error*. New York: Cambridge University Press, 1990.
4. State of Israel Health Department (File no. 6/97: 01/1997 and File no. 22/99: 4/1999): Rules for Tissue Specimen Handling.

### Capsule

#### Control of angiogenesis by AIBP-mediated cholesterol efflux

Cholesterol is a structural component of the cell and is indispensable for normal cellular function, although its excess often leads to abnormal proliferation, migration, inflammatory responses and/or cell death. To prevent cholesterol overload, ATP-binding cassette (ABC) transporters mediate cholesterol efflux from the cells to apolipoprotein A-I (apoA-I) and the apoA-I-containing high density lipoprotein (HDL). Maintaining efficient cholesterol efflux is essential for normal cellular function. However, the role of cholesterol efflux in angiogenesis and the identity of its local regulators are poorly understood. Fang et al. show that apoA-I binding protein (AIBP) accelerates cholesterol efflux from endothelial cells to HDL and thereby regulates angiogenesis. AIBP- and HDL-mediated cholesterol depletion reduces lipid rafts, interferes with VEGFR2 (also known as KDR) dimerization and signaling and inhibits vascular endothelial growth

factor-induced angiogenesis in vitro and mouse aortic neovascularization ex vivo. Notably, Aibp, a zebrafish homologue of human AIBP, regulates the membrane lipid order in embryonic zebrafish vasculature and functions as a non-cell-autonomous regulator of angiogenesis. *aibp* knockdown results in dysregulated sprouting/branching angiogenesis, whereas forced Aibp expression inhibits angiogenesis. Dysregulated angiogenesis is phenocopied in *Abca1* (also known as *Abca1a*) *Abcg1*-deficient embryos, and cholesterol levels are increased in *Aibp*-deficient and *Abca1 Abcg1*-deficient embryos. Our findings demonstrate that secreted AIBP positively regulates cholesterol efflux from endothelial cells and that effective cholesterol efflux is critical for proper angiogenesis.

*Nature* 2013; 498: 118

Eitan Israeli

**“The children now love luxury; they have bad manners, contempt for authority; they show disrespect for elders and love chatter in place of exercise. Children are now tyrants, not the servants of their households. They no longer rise when elders enter the room. They contradict their parents, chatter before company, gobble up dainties at the table, cross their legs, and tyrannize their teachers”**

Socrates (469–399 BC), classical Greek Athenian philosopher. Credited as one of the founders of Western philosophy, he is renowned for his contribution to the field of ethics. The Socratic method – a type of pedagogy in which a series of questions are asked not only to draw individual answers, but also to encourage fundamental insight into the issue at hand – remains a commonly used tool in a wide range of discussions