Ethical challenges in orthopedic surgery

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Abstract Despite our recent attention to ethical issues in orthopedics, we are still faced with multiple conflicts of interest that continue to pose ethical dilemmas to the practicing physician. Using four case scenarios, we review the potential conflicts of interest and the dilemmas posed by these frequently encountered situations. The ethical conflicts confronted in resident training, the introduction of new technology, physician advertising, and the obligations of the sports team physician are reviewed and discussed. The basic principles of medical ethics, including acting for the good of the patients and doing no harm, are discussed in the context of the four case scenarios.

Keywords Ethics · Resident training · Physician advertising · New technology · Team physician · Learning curve

Introduction

Because of our training and expertise, physicians are permitted to do things to people that, if performed by anyone else, could be considered felonious assault. Through our contract with society, physicians have been granted the privilege to interact with individuals in ways that no other citizens can [1, 2]. On any given day, doctors routinely invade people's

private lives, ask them decidedly personal questions, touch them, manipulate their extremities, expose them to radiation, inject them with potential toxins, prescribe them harmful chemicals, and even cut into their bodies. Ironically, when we are done, most people thank us for the incursion.

Significant obligations come with these privileges. We are obligated, as physicians, to use our knowledge of science and medicine to act for the good of our patients. We have a fiduciary responsibility, from the Latin *fiducia*, meaning trust, to place our patients' interests above all others, including our own. It is our obligation as physicians to hold our patients' interests and well-being as paramount [3, 4].

In addition, we are bound, not only by the ethical principle of non-maleficence, namely, to do no harm, but as physicians, we must go further. We are obligated to act for the good of our patients, fulfilling the ethical principle of beneficence. Avoiding patient harm is not sufficient; we, as physicians, must actively seek to do good for others. And because our actions as physicians can have such drastic consequences upon people's lives, everything we do to our patients and for our patients, falls under the domain of medical ethics.

This manuscript reviews four topics in medical ethics that have become especially interesting to the orthopedic surgeon. As orthopedic surgeons, we utilize more technology, more implantable devices, more industry support, and more mechanical innovations than any other branch of medicine. We are, therefore, exposed to the particular ethical issues and implications pertaining to the technological advances of this new technology. Because we are the clinicians primarily responsible for caring for athletes at all levels of play from young adolescent to paid professional, we must confront the unique ethical issues of balancing the often conflicting desires of the athlete, coaches, owner, school authorities, parents, and physician. As a profession, our orthopedics academy has taken the leadership role in recognizing the potential conflicts of interest

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that exist in physician marketing and advertising. And because orthopedic surgeons have placed such an emphasis on advancing medical education and orthopedic expertise, we again must be vigilant in balancing our obligation to patient safety and care and our obligation advance our learning.

Ethical issues in resident training, the use of new technology, physician advertising, and the role of sports team physician persist. As always, a critical analysis of these issues will be elucidating, and hopefully, promote additional questions and discussion.

Resident training

A PGY 4 orthopedic resident is first assisting on a total hip replacement. Having assisted the attending physician on many occasions, the attending allows the resident to prepare the femur. The resident reams the femoral canal appropriately. Upon broaching the canal with the femoral trail broaches, the proximal femur is fractured necessitating fixation of the fracture and conversion to a long stem prosthesis.

One of the central tenets of medical ethics that is repeatedly emphasized in the ethics literature is the physician's obligation to "act for the good of the patient". However, whenever a resident at the beginning of a learning curve performs a procedure that could have been performed better by a more experienced surgeon, both the teacher and learner are not acting for the good of the patient. In the above scenario, the patient required a more extensive surgical procedure, likely requiring additional anesthesia, incurring a greater blood loss, and necessitating a more complex prosthesis. The patient was subjected to greater risk, discomfort, and potential complications violating the medical dictum of "do no harm."

Additionally, respect for a patient's autonomy requires that patients be informed of their role in the teaching process. It is essential that patients be made aware of the presence of residents in the operating room, the extent of resident involvement in their case, and the level of experience of the resident. Patients must be allowed to make informed decisions regarding their participation in the medical education process.

So why would patients subject themselves to the potential of additional harm or discomfort? Because reasonable people understand that continuing medical education is essential for having trained physicians available to their community. Everyone would like only the most experienced surgeon to perform their surgery, only the most knowledgeable clinician to care for them. At the same time, people realize that additional physicians must continually be trained and that patient involvement is an integral part of that training. Because that training is necessary, and because the opportunity to learn on patients is essential to that learning, and because the differences between us are not so significant as to excuse anyone from doing a fair share in that training, every patient has an

obligation to participate in the medical education of our future physicians [5, 6, 7].

Consequently, supervising physicians have an obligation to ensure that medical training programs are carefully designed and appropriately supervised to minimize risks and harms to patients. Medical students and resident candidates must be carefully selected. Surgical education must remain a rigorous, sequentially organized, and vigilantly monitored. Invasive procedures should be carefully designed and supervised to protect patients. Every conceivable measure must be instituted to maximize the resident's training while minimizing the risk of injury to the patient.

These same issues must also be considered by established surgeons learning new techniques. Those physicians are similarly at the beginning of a learning curve where the risk to the patient is greater than with a clinician of more experience. In those situations, patients must be informed as to the surgeon's experience with the proposed procedure, the level of supervision available, and the potential additional risks incurred by an inexperienced surgeon. Likewise, everything possible should be done to minimize the patient's risk while the surgeon is still mastering a new technique, approach, procedure, or device.

The key elements of ethical behavior regarding medical training are informing the patient of the involvement of trainees and their role in the patient's care, and establishing strict procedures and criteria to minimize patient's risk. Instructors must inform patients of the resident's role in their care, and the potential additional risks and benefits that participation may incur. Similarly, surgeons who are themselves at the beginning of a learning curve should inform their patients of the status of that surgeon's level of expertise and the alternatives available to the patient should they chose not to participate in the learning process.

New technology

A biomedical manufacturer has developed new acrylic bone cement that polymerizes rapidly when exposed to the current from an electrocautery device. The cement is reported to save a significant amount of operating time by allowing a rapid set time once the implants have been positioned. Surgeons quickly embrace the new cement product. Within 1 year of the cement's release, multiple centers report radiographic evidence of cement fragmentation.

The introduction of any new technology, device, implant, or surgical technique raises a myriad of ethical issues. New technology, by its very nature, is typically untested and unproven in large patient groups. Most new technology is released to physicians and used on the general public after nominal testing and limited clinical trials. Potential complications can go unrecognized for years and may come to light only after large numbers of cases have been performed [8–11]. So

why embrace unproven technology and what are the ethical consequences and obligations of doing so?

There are many reasons for adopting innovative technology. New devices or innovative surgical techniques may fill a void in our armamentarium of patient care options. New technology may address a problem that was previously unsolvable or may improve upon an existing treatment modality that had previously been ineffective or incomplete. But clinicians must be cognizant of other reasons for adopting new technology that may have more to do with the clinician's self-interest or pressure from patients. Before embracing new technology, orthopedic surgeons must carefully examine our reasons for utilizing unproven modes of treatment with the potential for substantial risks to the patient.

Many patients, as well as their physicians, want what is new. People often equate new with better, new with improved, and new with the latest technological advances. Patients frequently present to our offices with internet articles, advertisements, and publications in hand, touting the newest technologies in our field. Understandably, patients always want the best, and they imagine that anything newer is better. Likewise, physicians want to be on the cutting edge of new technology. Using new devices or learning new techniques can be exciting. Performing the same operation day in and day out can become boring, while trying new technology can be stimulating.

Also, being the first one on the block to offer new technology can be a powerful marketing tool. Patients want their doctors to be current and offer the newest advances and techniques. These dynamics motivate some physicians to introduce new techniques before they are adequately proven sometimes merely as marketing gimmicks. Minimally invasive surgery platelet-rich plasma, anterior approach to the hip has been touted as being safer, better, and more effective than more traditional modalities, even though much of the literature has demonstrated uncertain or conflicting results. Whereas patients equate new with better, every practicing physician has seen the catastrophic outcomes that can occur with unproven devices, techniques, or medications.

When new technology is released for general use, that release is often based upon the experience of a few investigating specialists. Often, those initial investigators have dedicated enormous amounts of time and efforts to developing expertise with the new technology. Once the technology is released for general use, however, the clinical outcomes may be vastly different from those reported by the investigative group. The training required to begin using new technology can range from tightly regulated instructional programs, to self-instruction articles, to technique videos. Likewise, clinicians utilizing new technology may come from a highly variable experience pool. Surgeons' experiences, skills, and styles vary widely. Such differences explain why complications that are not identified within the small investigative sample may arise when the innovations are adopted by a large number of clinicians.

Additionally, there is always a learning curve with any new technology [12•]. Even with minor alterations of devices, there is some new learning that needs to occur. Obviously, more complex procedures, approaches, or devices take longer to master. Also, surgeons bring their own experiences and expertise to the table. An experienced arthroscopist may take very little time to learn a new arthroscopic technique, whereas, an experienced joint surgeon who performs relatively few arthroscopic procedures may take much longer. Surgical hubris must also be factored into the learning curve. Some surgeons feel comfortable even after observing a single case, whereas others may not feel ready even after multiple supervised procedures. Adequate preparedness cannot simply be a matter of the surgeon's comfort as this may reflect ego and eagerness rather than surgical skill. For all of these reasons, the profession should consider the circumstances that justify expanding requirements for certification of clinician competency and credentialing before surgeons are allowed to apply new challenging and dangerous techniques.

The introduction of new technology requires close monitoring. The clinical outcomes in a small study group may be vastly different from the results in the general population. Low incidence problems may not present themselves until large numbers of cases have been performed. Likewise, some very serious complications may not become evident until several years after the index procedure or treatment. We have previously made the case for a joint registry for these very same reasons [13]. Several severe and catastrophic device complications were quickly detected in countries with mandatory registries. These same complications have taken much longer to detect in the US, to the detriment of many patients, because our orthopedic community relied solely upon individual site reports.

Again, patients must be honestly informed as to the extent of a surgeon's experience with a planned procedure that uses new technology. Obviously minor alterations in a well-established procedure or in a commonplace device may not warrant an extensive explanation. Using any new or unproven procedure, approach, or device that involves inherent additional risks related to its novelty, should be fully explained to the patient, as should information on a surgeon's initial steps onto a learning curve. A forthright approach reflects the ethical standards expected for truly informed consent.

Physician advertising

An orthopedic group located in a region with several competing orthopedic practices repeatedly advertises its remarkable successes in performing risk-free, bloodless surgery, curative platelet injections and immediate return to sports activity with their pioneering approaches.

Trust is an essential feature of the physician-patient relationship. When a patient initiates a professional relationship with a physician, it is reasonable to expect that the doctor will act in the patient's interest. Anything that disturbs that foundation of trust stands to jeopardize the physician-patient relationship [14].

Therein lies the potential ethical problem of advertising. Any physician advertising that can be interpreted as deceptive, inaccurate, exaggerated, dishonest, or misleading has the potential for undermining trust in medicine. Once the patient's trust is lost, it is exceedingly difficult to regain. And the patient's distrust of medicine can extend to the untrustworthy physician's specialty, hospital or even the medical community at large.

Unfortunately, many businesses advertise in ways that could be construed as deceptive or misleading. Consumers approach non-medical advertisements with a "buyer beware" sensibility. Medical consumers, however, do not typically approach their physicians with that same suspicious attitude. Because doctors are regarded as having fiduciary responsibilities, physicians are ethically obligated to act for the patients' good, and patients are encouraged to assume that their doctors are working to promote their interests. They do not expect physicians to be deceptive or misleading.

Likewise, patients are often in a vulnerable state when seeking medical care or expert advice. Their primary concern is getting well. They assume that the information provided by their physicians, including the content of advertisements, will be honest and accurate. Patients rely upon the accuracy of what their physicians say because the profession encourages that reliance and trust. Medicine could not work without that blind trust. For that reason, physicians have an obligation to be truthful and accurate in the advertisements.

The AAOS has gone to great lengths to ensure that its members comply with the highest possible professional standards if they are going to advertise. The Academy's Code of Medical Ethics and Professionalism [3], Principles of Medical Ethics and Professionalism in Orthopaedic Surgery [2], its Standards of Professionalism: Advertising by Orthopaedic Surgeons [15], and its Opinions on Ethics and Professionalism: Advertising by Orthopaedic Surgeons [16] have all been written to guide the orthopedic surgeon with regards to ethical advertising and marketing. The Standard of Professionalism even goes so far as to hold the physician responsible for the contents of advertising by their hospital or medical group.

The sports team physician

During a title game, a high school basketball player is struck by another player while attempting to block a shot. He falls to the ground holding his right shoulder. Examination demonstrates an obvious empty glenoid and a prominent anterior humeral head. A diagnosis of an anterior dislocation is made.

The trainer and team physician reduce the shoulder under local sedation. Both the coach and the player beg that he be allowed to return to the game. Upon his return, the player is hit again, injuring the same shoulder. Radiographs at the hospital demonstrate a fracture-dislocation of the shoulder.

The above scenario illustrates a host of ethical issues that arise across the spectrum of team sports injuries. The ethical dilemmas posed in treating patients with sports-related injuries involve numerous conflicting goals and agendas. The resulting dilemmas make the determination of appropriate treatment exceedingly difficult and muddy the waters of the traditional doctor-patient relationship. Nevertheless, the same medical and ethical standards that apply in the traditional office setting must be implemented here.

In our example, the team physician may feel conflicted in his obligation to do what is best in treating the injured athlete because that physician may be employed by or under some contractual obligation to a school, organization, or owner. The pressure to return this player to the game, especially a high stakes play-off game, may alter the care that would otherwise be rendered in a less charged, non-competitive setting [17•]. Likewise, the presence of scouts or agents clouds the issue with additional pressure for returning the player to the game. The decision should, however, focus on the long-term medical benefits of this patient. Therefore keeping him from play should take precedence over short-term scholastic, financial, or employment goals that may be realized by returning him to the game? There are also issues of autonomy that must be considered.

Respect for autonomy requires that other accept the choices of the individual even if they disagree with those choices and the value system upon which those choices were made. If an athlete is no longer a minor, and if the athlete can provide reasons to support the choice, the athlete's decision must be accepted and respected by the team physician, even if the physician disagrees. This does not mean, however, that the physician must comply with every demand the athlete makes regarding treatment regimens or return to play decisions. The physician must still advocate for it is in the medical interest of the patient. Compounding the issue is a circumstance in which the student-athlete is a minor. In such cases, any treatment rendered, other than emergency care, requires parental consent [18•]. The return-to-play decision should, however, be left to the judgment of the team physician.

When dealing with team sports injuries, even the basic ethical principle of "acting for the good of the patient" becomes complicated. Who defines what is the "good of the patient", the athlete, the team physician, the coach, the parents? Are the long-term stability of this patient's shoulder and the avoidance of post-traumatic complications necessarily better for this athlete, if achieving those goals results in forfeiture of a collegiate scholarship or the opportunity to play on a professional team? These decisions are easier to navigate in

the office setting rather than on the field, court, or pool. When an athlete's future may be jeopardized by missing several games or an entire season, the decisions become much more difficult.

Even if the choice is made not to return this player to the game, the ethical dilemmas may persist long after the match has ended. How soon can the player return to subsequent games? Who decides on the long-term treatment plans? If, for example, a variety of treatment options are proposed, who decides which option is best for the patient, and what treatment guidelines take precedence? Does the remedy that more quickly returns the player to competitive sports take priority over one that may require a prolonged recuperation but provide more enduring medical outcome? Again, if championship games, scouting prospects, or scholarship opportunities are on the line, in the athlete's eyes, the short-term gains may far outweigh the proposed long-term benefits.

It is relatively easy to propose that the best treatment for this young athlete is to withdraw from play, treat the injury in the least harmful and most predictable way, rehabilitate the injury to its fullest, and return to play only when complete healing has occurred. Often, this is not realistic in sports injuries. Short-term goals frequently outweigh long-term sequelae. Social circumstances may significantly outweigh medical concerns. The perspective on what is good for the patient may differ widely based on who is making the assessment, the patient, the parents, the coach, or the physician.

That said, the team physician must still adhere to the ethical principles guiding our profession. The physician has a fiduciary responsibility to place the welfare of the patient above other concerns and must focus on the good of the patient, not the team, nor the scouts, nor the parents. The team physician has an obligation to care for that patient and advocate for what will be medically best for the athlete. Sports team physicians must explain to their patients all the available treatment options and suggest which of those options will best serve future health. Most importantly, a team physician must always uphold the role of patient advocate rather than team employee.

Conclusion

We have presented four scenarios which frequently pose ethical dilemmas in the practice of orthopedic surgery. Training new physicians, learning new technology, advertising physician services, and serving as a team physician can place an orthopedic surgeon in conflict with the guiding principle of our profession, namely, to act for the good of our patient. All of these situations can potentially place the patient in harm's way, or at the very least, jeopardize the physician-patient relationship.

Our contract with society allows us to do things to individuals that no other citizens are permitted to do. These privileges come with the obligation to prioritize the health, safety, and

interests of our patients. Because the actions of physicians can have dire consequences upon patients' lives, all of our actions fall under the domain of medical ethics. We are, therefore, bound by the ethical principles of *do no harm* (non-maleficence) and *act for the good of our patients* (beneficence).

At the same time, it is also important to keep in mind that medicine is continuously changing. The American Academy of Orthopaedic Surgeons has taken the leadership role in developing ethical policy and educational material to enable members to navigate the ethics of evolving medical practice [19•]. As our field advances, new ethical challenges may arise. Changes in resident training, medical technology, reimbursement arrangements, hospital alliances, practice structures, and informatics will likely pose new and unforeseen ethical issues. As these new ethical dilemmas arise, it is important to maintain the profession's focus—the good of the patient. Conflicts of interest will always be a part of the practice of medicine. Physicians, therefore, need to remain alert to the many influences that can divert their attention and lead them astray.

Compliance with Ethics Guidelines

Conflict of Interest Dr. James D. Capozzi and Dr. Rosamond Rhodes declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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