How to Perform “Reverse” Translational Research in Anatomy—Next Step

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We have used a so-called reverse translational research paradigm with anatomical studies, many of which have been cadaveric feasibility studies, over the last 25 years in order to first identify clinical problems and then devise potential anatomical solutions. Several of these anatomical studies have gone on to be used by surgeons and with good outcomes. Therefore, such cadaveric feasibility studies, in our experience, can influence surgical practice and more rapidly than the average time of 17 years for typical translational research to be used in patients.

Unfortunately, anatomical studies are often performed by nonclinicians or physician anatomists who are disconnected from clinical practice and therefore the direct impact on clinical care can be limited. Therefore, working and collaborating with physicians and surgeons will better aid the anatomical researcher in focusing their studies so that they have the most potential in helping patients with the most up-to-date anatomical solutions. Several of these anatomical studies have gone on to be used by surgeons and with good outcomes.

Although the process of reverse translational research in anatomy might be intuitive, many colleagues have questioned how to go about such research. With this in mind, we have outlined our process below including various strategies/suggestions for generating clinical/surgically relevant studies that have been useful to us and our research productivity.

1. Try to attend clinical conferences where patient complications and poor outcomes are addressed. Such meetings can help the clinical anatomist identify deficits in our anatomical understanding that might be rectified with an anatomical study.

2. Organize meetings with clinical and surgical colleagues to discuss gaps in their clinics as practitioners that might be elucidated with anatomical studies. As these colleagues are often quite busy, such meetings are often best carried out in the hospital where they work or via electronic meetings.

3. Put together small clinically oriented meetings on your school’s campus that bring in clinical/surgical speakers who can highlight their work and discuss potential anatomical studies that might improve their clinical/surgical outcomes.

4. Stay apprised of the latest research in clinical or surgical journals by following various journals online. Some clinical journals publish anatomical studies and the clinical anatomist can get a sense of what such journals are interested in publishing and staying tuned in to such publications.

5. Make your department a beacon that is known for facilitating anatomical dialogue/studies for physicians/surgeons on campus or from local hospitals.

Once a clinical anatomical gap is identified that cadaveric investigation can help address, a typical study plan is implemented. Prior to beginning the study, we strongly suggest having several clinical/surgical colleagues review the paper so that all bases are covered with the investigation. As an example of our experience with the reverse translational research in anatomy approach, two projects are discussed below.

A colleague of mine who is a peripheral nerve surgeon approached my laboratory with the following surgical problem: during excision of large intrapelvic nerve tumors via the gluteal approach, often it was difficult to remove the large intrapelvic component of these tumors that extended through the greater sciatic foramen into the gluteal region. My surgeon colleague and I discussed the problem and put together an anatomical study to address the same. First, we measured the vertical working space of the greater sciatic foramen and then we measured the increase in space that resulted from transecting the sacrotuberous ligament. Subsequently, we measured the increased working space that was obtained after cutting the sacropinous ligament. We concluded that by cutting these ligaments, the surgeon should expect at least a gain of 1.4× in the working space for removal of tumors of the greater sciatic foramen with a large intrapelvic component.¹

Several spine surgery surgeons, at a weekly morbidity and mortality meeting, brought up the fact that many patients undergoing cervical spine surgery would often wake up with C5 spinal nerve palsy. After much trial and error, an anatomical study designed to analyze this postoperative complication, concluded that the most likely source of the problem was that the surgeons were taping the shoulder in...
a depressed position during the surgery in order to move the shoulder away and out of the cervical operative region. In the cadaver model, we illustrated that such traction placed tension on the upper contributions to the brachial plexus, especially the C5 spinal nerve rootlets. Although anecdotal, the surgeons admit that since these findings, they have discontinued taping the shoulder in a depressed position and have not had such a complication since then.

Taken together, these two examples of surgical complications/problems brought to our attention by surgeons, help illustrate the notion of reverse translational research in anatomy. It is hoped, as with all such studies, that the resultant cadaveric studies will help improve outcomes in patients who might undergo such procedures.

Conflict of Interest
None declared.

References
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