Surgeons use 3D-printed implants for complex bone problems

Two BIDMC orthopaedic surgeons are among the first to use customized 3D-printed implants to give people with serious, complex medical issues the chance for a better outcome—more mobility and quicker rehabilitation—than traditional treatment options.

3D printing, also called additive manufacturing, involves making three-dimensional objects by assembling layers of material on top of one another, has been around since the 1980s. The medical field has been harnessing the technique for a range of solutions from prosthetics to prescription pills to human tissue. In orthopaedics, the improvements in patient imaging and 3D printing over the past 10 to 15 years is making customized bone implants a reality for patients who otherwise have limited or no treatment options.

Talus replaced

BIDMC foot and ankle surgeon Chris Miller, MD, implanted a 3D-printed talus, the bone that connects the leg to the foot and enables ankle movement, in a woman who had literally lost one talus in an accident.

Harvard Medical School appoints Mary Bouxsein full professor of Orthopaedics

The Department is delighted to announce that Mary L. Bouxsein, PhD, has been appointed as Professor of Orthopaedic Surgery at Harvard Medical School. Bouxsein is the third woman to be promoted to Professor of Orthopaedic Surgery at Harvard Medical School and the first woman from the Department of Orthopedics at BIDMC to attain this distinction. She directs the Center for Advanced Orthopedic Studies at BIDMC, and is a world recognized leader in osteoporosis, bone biomechanics and skeletal fragility.

“I am more than proud that HMS has recognized Dr. Bouxsein for her excellence in the fields of biomechanics and non-invasive imaging of skeletal health,” said Department Chief Mark Gephardt, MD. “She has not only authored hundreds of peer reviewed publications and served as principal investigator on dozens of nationally and internally funded research projects, but is an exemplary mentor to the students and fellows in her lab. The appointment is very well-deserved.”

Monique Rodrigues was headed to work as a security guard in Boston one snowy night in December 2017, when the car she was riding in was in a crash. The talus in her right ankle was thrown out of her body and not recovered. The Boston trauma center that treated Rodrigues provided a temporary solution by placing a cement spacer where the talus had been as well as a fixator, pins and rods that kept her ankle stable. Surgeons at the hospital suggested she undergo the standard treatment in cases like hers, an extensive hindfoot fusion in which the tibia (shin bone) is fused to the calcaneus (heel bone). The operation saves the limb, but immobilizes the ankle.

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Welcome to our first issue of the year! It’s been an exciting time for sports fans in New England with the Patriot’s Super Bowl win, and here at BIDMC we’re also enthused about continuing to move the ball with cutting edge orthopaedic medical care and research.

First we bring you an article about using the latest technology to optimize the lives of people with complex orthopaedic problems. Our cover story on 3D-printed implants shares how two BIDMC surgeons are leveraging advanced imaging and 3D printing to implant devices that exactly match their patients’ anatomy. In one case, Christopher Miller, MD, helped save a young woman from a lifelong limp by implanting a 3D-printed ankle bone. Megan Anderson, MD, an orthopaedic oncologist, has given several patients with pelvic tumors customized implants that allow them to walk when there were very inferior—or no—alternatives.

Another feature in this issue addresses one of the most pressing healthcare issues today: opioid addiction. It explores the findings of the first retrospective literature study on long-term use of opioids following surgery and trauma. The study, authored by an orthopaedics clinical and research team, was published in the *Journal of Bone and Joint Surgery* last August. The piece in this newsletter covers their methods as well as findings and insights on the factors most strongly linked to opioid addiction.

We also look at a pilot study that is measuring the alignment of individuals with lumbar spinal stenosis in our motion analysis lab to help describe the condition and determine how surgical correction impacts it. Although surgery for spinal stenosis is common in this country, outcomes are measured by patient reports only. The study, led by Andrew P White, MD, and research scientist Dennis Anderson, PhD, is one of the many examples of clinical-scientific collaborations that are the hallmark of academic medical centers like BIDMC.

Finally, while we’re known for orthopaedic and sports medicine, we have added an entirely new category of procedures to our realm of expertise. Sammy Dowlatshahi, MD, who holds appointments in both the Orthopaedics and Surgery departments, blends his hand surgery and plastic surgery skills to offer hand rejuvenation. A growing interest in aging well has led to the development of innovative techniques that enhance skin and its underlying tissue, giving patients options for more youthful looking hands. You will learn how Dowlatshahi, in a first for BIDMC, uses a spectrum of the latest minimally invasive procedures to accomplish striking results in this field.

Sincerely,

Mark C. Gebhardt, MD
Chief, Carl J. Shapiro
Department of Orthopaedics
BIDMC study reveals risk factors for opioid misuse after surgery and trauma

Depression, back pain and previous drug use put patients at highest risk

Patients taking opioids after medical care has contributed to the nationwide addiction epidemic: about 2 million people in the United States have opioid use disorder associated with prescription opioids, a group that accounts for half of all opioid-related deaths in the country. These sobering numbers are of special concern for surgeons, who must balance post-operative pain management with patients’ risk of opioid dependence for the estimated 234 million patients who undergo major surgeries each year.

Researchers and clinicians at BIDMC performed the first meta-analysis of factors that place patients at an increased risk of long-term opioid use. The report, published in the August 1, 2018, edition of the Journal of Bone and Joint Surgery, revealed that certain prescribing patterns, surgical procedures and patient characteristics increase the risk of prolonged opioid use following surgery or trauma.

After combing through the medical literature of adult opioid use in surgical and trauma settings, the researchers analyzed findings from 37 studies with nearly 2 million participants. “We looked at studies published as early as 1997, and some that enrolled the subjects for 20 years,” said lead author Amin Mohamadi, MD, MPH, a post-doctoral research fellow. Mohamadi and colleagues at BIDMC began with almost 10,000 studies, searched them electronically, and after screening for relevance, data adequacy and quality, narrowed those down to 67 studies before selecting 37 for review and analysis.

The literature review was prompted by concern about the recent opioid epidemic in the United States, but it spanned literature and databases worldwide. “We discovered opioid misuse is not just a problem here—it’s a global problem,” said Mohamadi.

During the preliminary research, the BIDMC team found considerable inconsistency among the studies’ conclusions about risk factors. “Some studies report, for example, that household income or race is a significant risk factor for prolonged opioid use,” Mohamadi said. “But other studies say they are not significant, that there are other factors that are putting patients at higher risk.”

The studies also varied considerably on the reported rates of prolonged opioid use after surgery or trauma. “Some research studies reported that 4 or 5 percent of post-op patients will misuse opioid long term, while one study reported that number was less than 1 percent. We wanted to address the discrepancies,” explained Mohamadi.

The aim of the BIDMC study was to synthesize existing data to pinpoint risk factors with statistical reliability.

Patient risk factors, trends and rates

By pooling the data, the BIDMC team demonstrated the most important factors in predicting which patients would continue to use prescription opioids long-term were, in order of significance: prior use of prescribed opioids, back pain, depression, and a history of benzodiazepine use. For people who had depression and chronic pain that was being managed with antidepressants or non-narcotic pain killers, those conditions did not appear to increase the probability of prolonged opioid use.

“Approximately 4 percent of the general population will use prescribed opioids for an extended time after surgery, but, among patients with a history of prescription opioid use, nearly a quarter of patients will continue to use prescribed opioids for an extended time period after surgery,” said Ara Nazarian, PhD, a principal investigator in the Center for Advanced Orthopaedic Studies at BIDMC and a co-senior author of the study with Arvind von Keudell, MD. “Understanding the pooled effect of risk factors can help physicians develop effective and individualized pain management strategies with a lower risk of prolonged opioid use.”

The BIDMC team noted that physicians’ prescribing practices influence the incidence of prolonged opioid use. For example, long-term opioid use was shown to be significantly higher among patients treated in the emergency room by prescribers with a high rate of prescribing opioids than among those treated by prescribers with a low rate. Physicians also tend to prescribe opioids to women more often than men, and may opt for opioid analgesics instead of non-steroidal anti-inflammatory drugs in patients with cardiovascular concerns, prescribing practices that may explain why gender and cardiovascular health are also significant risk factors for prolonged opioid use.

In addition to looking at which risk factors were related to prolonged opioid use, the BIDMC study examined whether different groups had higher rates of long-term opioid use and the overall misuse of opioids in populations over time.

In terms of trends, the researchers observed a significant increase in the rate of prolonged opioid use from 1997 to 2015.

Our findings suggest that addressing mental health problems and managing postsurgical pain using multiple modalities—including non-narcotic analgesics—could mitigate the risk of prolonged use of opioids associated with depression or pain.

– Amin Mohamadi, MD, MPH

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A BIDMC pilot study for people with lumbar spinal stenosis who are candidates for surgery aims to reveal precisely how the condition and the procedure affects spinal alignment using the latest biomechanical technology. The study, now enrolling patients, involves measuring the posture and walking of volunteers prior to surgery and several months after surgery.

Lumbar spinal stenosis is a condition commonly experienced by older adults: the spinal column narrows and impinges on the nerves during the aging process. While it can occur without symptoms, others experience pain, weakness or numbness in the legs or lower back when standing or walking. Symptomatic lumbar spinal stenosis (SLSS) is sometimes called the “shopping cart” syndrome.

“When people with spinal stenosis lean forward as they walk as if they are pushing a shopping cart, they’re creating a little more space for their nerves and they’re able to continue walking with less pain,” said BIDMC orthopaedic surgeon Andrew P White, MD, who launched the collaborative study with biomechanical scientist Dennis Anderson, PhD, and Anderson’s colleagues at the BIDMC Center for Advanced Orthopaedic Studies.

SLSS can be treated with nonsurgical options such as corticosteroid injections and other medication as a first line of treatment. When these are not sufficient, surgery to decompress the affected nerves called laminectomy can be done. In some cases, surgeons perform lower lumbar spinal fusion at the same time as laminectomy to help stabilize the spine.

“With laminectomy, one of the goals is to allow the patient to walk as long as they want without having to stop or lean forward. So they’re tolerance for walking improves. Also they’re alignment improves because they have adequate space for the nerves they didn’t have before,” explained White.

“Surgical treatment typically enables patients to walk faster and for longer distances,” added Anderson. “But previously there has been no direct measurement of the problems with walking before the procedure or the physical changes after treatment.”

Currently surgeons measure the outcome of the procedures they perform by asking patients, often via surveys, how they’re doing and what they can and can’t do. “Patient reported outcomes is a popular and important way of measuring what we do,” White said. “But it’s limited because the person reports on their own performance and there is no standardization of the outcomes to help other patients and their spine surgeons know what to expect in each patient’s situation.”

**Motion analysis testing**

The BIDMC motion analysis lab built two years ago is equipped with the sophisticated technology and trained researchers needed to objectively evaluate spinal alignment and mechanics. “We can measure walking performance and spinal alignment in the lab to a high degree of accuracy,” said White. The type of data being collected by the SLSS pilot study—the first of its kind anywhere according to Anderson—could potentially be used along with self-reported outcomes to better assess which procedures have value.

The study has a target of 30 volunteers with several already enrolled. The idea behind the research is to measure spine and hip motion when standing and walking before and after surgery to see how it changes. “Each patient functions as their own control,” said White.

Study volunteers make two visits to the motion analysis lab. During each visit small reflectors are taped to different locations on the subject’s body. The reflectors’ positions are captured by special video cameras placed at different heights and angles around the room, and are connected to a computer.

On the first visit, participants are asked to walk. “We measure their movement both when they’re rested and feeling okay, and then after their symptoms have started to flare up,” said Anderson. “We’re aiming to quantify the effect of the pain, or what we call claudication symptoms, on their walking.” Then once the patient is recovered—four to eight months post-surgery—the testing is repeated.

So far, Anderson reports the collected information has been good. “The literature on what normal looks like is robust, so we can compare the study data to what we would expect to see in a normal population.”

**Potential outcomes**

The findings of the SLSS pilot study—or a larger study of similar design that could follow it—hold the potential to inform patient treatment guidelines of the future.

“With research we sometimes find that inexpensive interventions are very effective and expensive ones are not,” said White. If proven, the study’s hypothesis could follow that path. “Our hypothesis is that decompression alone will improve patients’ spinal biomechanics considerably, so it’s not necessary to do fusion to control their upright posture—they will become upright themselves.”

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Hand rejuvenation: the next new anti-aging treatments focus on enhancing hands

It is not how old you are, but how you are old.  
- Jules Renard

Today’s older generation expects more from their later years than previous generations: remaining healthy, staying active and looking youthful are replacing the more passive notion of “aging gracefully.” And that change is reflected in the modern trend of anti-aging procedures that focus on the face, head and neck as well as the contour of the abdomen, breasts, thighs and arms. Now procedures to improve how the hands appear are becoming more in demand and showing better and better results.

“If you look at the hands, they’re a telltale sign that someone is aging,” said Sammy Dowlatshahi, MD, a BIDMC hand surgeon who bridges the specialties of orthopaedics and plastic surgery. “With a face lift or Botox injections and practicing good skin care, almost anyone can look younger than they are, but the hands do not lie. Their hands tell their age.”

Dowlatshahi is on the frontline of hand surgeons performing an amalgam of treatments known as hand rejuvenation. In addition to cosmetic procedures that enhance the appearance of patients’ hands, he performs reconstructive surgery to address functional issues of the hand.

Following is a Q&A with Dowlatshahi on hand rejuvenation.

What is hand rejuvenation?
Hand rejuvenation aims at improving the aesthetics of the hands to counteract the natural process of aging and give them a more refreshed and youthful appearance.

How do hands age?
Hand aging is a multifactorial process. There is volume loss, skin thinning, wrinkling and pigmentation changes. In addition, the underlying boney framework undergoes an aging process—arthritis—which varies among individuals and is largely genetic.

What do you mean by pigmentation changes?
Predominantly age spots or solar lentigines. These are usually associated with sun exposure, but patients sometimes have precancerous lesions or even skin cancers that need to be addressed and are mistaken as age-related changes. Hands, face and upper chest all undergo similar changes since they are equally exposed to the sun.

How do you assess a patient for hand rejuvenation?
I perform a comprehensive evaluation from skin to bone: I examine the suppleness of joints and the status of nerves, tendons and skeletal structure. I look carefully to make sure patients don’t have any precancerous or cancerous lesions because the top of the hand is a very sun exposed area. X-rays are often part of the comprehensive evaluation. Other conditions such as tendinitis are addressed as well.

What qualifications are important for performing hand rejuvenation?
A thorough knowledge of the anatomy of the hand is critical. Understanding the fascial planes and the adipose compartments, and having a keen aesthetic sense are very helpful in addressing the patient’s functional and aesthetic concerns. These are proficiencies acquired by surgeons who are ideally certified in plastic surgery and have completed a hand surgery fellowship.

Is hand rejuvenation safe?
We know that each treatment modality we perform is safely used in other areas of the body. But virtually every treatment carries risks. These are discussed with the patient up front. It’s important to find a surgeon who will take the time to explain the procedure clearly, including the risks, benefits and alternatives, and with whom the patient feels at ease.

Do you use different procedures for different problems?
We customize the treatment based on the patient’s needs, expectations and comorbidities. To restore volume, what’s working well for us is fat grafting. It’s probably the longest-lasting, most powerful tool we have for hands that seem thinner due to age. Another commonly used option for volume loss is the use of dermal fillers that are also used in the face.

To resurface the skin, I use a combination of treatments that might include a skin care regimen, peels, microneedling, fat grafting, and injections of plaquelet-rich plasma or PRP, which is the patient’s blood processed to isolate a component that contains a lot of growth factors.

How does the fat grafting procedure work?
We harvest fat from wherever the patient has excess, often the mid-section of the abdomen, via liposuction under local anesthesia. We take just a couple of milliliters of fat out with small cannulas (tubes), then process it. The harvested material is centrifuged to separate out the fat fraction. I then use very small cannulas to inject it into the areas that are volume deficient, sometimes guided by ultrasound. The fascinating thing about fat is that it not only fills in areas of volume loss but also has a profound effect on the quality of the overlying skin.

What happens after the fat injection?
After a fat injection procedure, a patient should expect some bruising and swelling. I tell patients to take it easy for a couple of days, as instructed, and expect the results to improve up to a year later. We achieve the best results when treating the whole hand, not just a isolated area. This way, the overall appearance looks more balanced.

Hand rejuvenation counters age-related changes such as thinning skin, pigmentation, wrinkles and volume loss.

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Hand Rejuvenation continued from page 5
of days to allow the fat to stay in the specific location where it was placed—I don’t want it to disperse. After several weeks, about 50 percent of the fat gets resorbed and the rest remains.

Why do you prefer fat grafting over fillers?
Fillers are temporary; they last six to 12 months, 18 months at most. Because fat is living tissue, it’s permanent—you don’t have to keep repeating the procedure. Another advantage of fat grafting is that the material used is from the patient’s own body so they won’t reject it or experience an inflammatory response, as sometimes occurs with fillers. Also, we can perform very superficial injections without leading to a bluish skin discoloration called the “Tyndall effect.”

What are other skin enhancing treatments?
We use the same methods applied in facial rejuvenation: chemical peels, laser treatments, skin care and needling. These allow the skin to thicken and regain elasticity, which in turn addresses fine wrinkling and pigmentation changes. My philosophy on hand rejuvenation is that both volume changes and the overlying skin quality must be addressed to give a good result.

Could you explain how needling works?
Medical needling is a powerful technique I use to improve skin quality and tone. It requires little downtime and has an acceptable risk profile, yet it can have remarkable effects.

Spinal Stenosis continued from page 4

Another possible benefit of biomechanical measurement pre- and post-surgery is helping to personalize a patient’s treatment. “The medical literature shows patients can walk longer after laminectomy, but they’re still not necessarily functioning at a normal level,” Anderson said. “Once we see how people are actually walking before they have surgery, we can see how that correlates with how well they recover. With more population level data, we could potentially start measuring patients before surgery and use that data to help plan their surgical intervention as well as physical therapy.”

The study results could deliver unexpected outcomes. “There’s at least one paper that shows after people have decompressive surgery, they don’t change their posture much. Our study may confirm or further elucidate that finding,” said White. “Pre-surgery posture may continue because it’s familiar, or perhaps there’s stiffness of particular joints or things that become uncorrectable. We don’t know what we will learn, but whatever it is will be interesting.”

Regardless of the specific results, the research is already laying the ground work for future patient studies at BIDMC. Prior to launching the spinal stenosis project, BIDMC researchers determined that measurements of several important spine movements are reliable—a necessary precursor to measuring changes due to surgery.

Why study spinal stenosis?
Spinal stenosis is one of the most frequently performed surgeries for older people in the United States. “One reason it’s so common is that spinal stenosis typically affects people 65 to 85 years old, and baby boomers are in that group now,” said Andrew P White, MD, who performs about 100 laminectomies a year at BIDMC. “In generations past, people that age were not particularly interested in doing sports or being really active. Today, they are not okay with walking limited distances.”

Consequently, people with the condition are motivated to get treatment. “When people can’t stand or walk, they are driven to address it—to have treatments, to have surgery,” said White. “The lack of mobility is an important public health issue and it’s also a problem we think is highly relevant to mechanics.”

You create very small channels in the skin using a device, similar to a lawn-aerator. Depending on what I’m trying to treat—a scar that needs to be softened and lightened or intact skin with an aged appearance—I’ll adjust the depth and density of needling. This induces an inflammatory process that leads to the desired changes. I also routinely use this method for reconstructive issues and scarring; I’m now conducting a study on the combined effects of needling and fat grafting on scars.

How soon do patients see results?
With fat grafting, you put fat in and it immediately affects surface contour. But it takes about six-to-eight weeks to see how much of the fat “takes.” With needling, the patient usually sees a difference in as soon as one week.

That said, in aesthetic medicine in particular, a good patient-physician relationship sets the stage for success. That’s a relationship where the surgeon understands the patient’s goals and feels they are achievable, and the patient’s expectations are grounded in an understanding of the promise and limitations of the techniques being recommended. For an optimal outcome, patient commitment to post-procedure care is also crucial.

Sammy Dowlatshahi, MD, offers hand rejuvenation at the BIDMC Foot & Ankle Center in Dedham. For more information, to schedule a consult contact: 617-667-3940 or orthoband@bidmc.harvard.edu.
**3D-Printed Implants continued from page 1**

Rodrigues was not happy with the prospect of having a limp and limited motion, and sought a second opinion. She met with Miller six weeks after the accident for a consult. Miller had researched case studies about 3D-printed talus implants, and felt that was the option that offered the most potential to preserve Rodrigues’ ankle.

“She was only 19, and I wanted to maximize her ability to have a normal, functioning ankle for as long as possible,” said Miller. “The talus implant is something that would allow her to move and give her more function than the fusion procedure.” He discussed the relatively new approach with Rodrigues, and she agreed it would be the best choice for her.

To start the process, Miller ordered highly detailed CT scans of both of Rodrigues’ ankles and her healthy talus. Next the scans were sent to an implant device company, which created a computer model of the missing talus by mirroring the image of the remaining one. To make sure the size and shape were correct, the company printed two 3D models in plastic and sent them to Miller.

“One is the actual size measured and one is 1 millimeter smaller in case the soft tissues have contracted,” he said. Miller assessed which would be a better fit, and gave approval to have the prosthetic printed using layers of cobalt chromium—the same material used for hip and other joint replacements.

Two months after the consult, the surgery went smoothly. After surgery Rodrigues had some stiffness, probably due to the length of time the spacer had been in place, and painful swelling when she walked. To relieve these symptoms, Miller performed two outpatient surgeries over the next six months: one to lengthen her Achilles tendon and one to remove scar tissue.

With the adjustments followed by recovery and weeks of physical therapy, Rodrigues is doing well today and plans to return work in March. “I can drive without pain, I can walk better and longer, and go up the stairs fine,” she said. “I’m so happy I went to Dr. Miller. If I had had the fusion, one leg would have been shorter than the other and I would have a limp.”

The implant is likely the first of its kind in the Boston area. “There have only been about 45 total talus prostheses procedures with 3D-printed implants done in the United States and 60 in the world,” estimated Miller. Most of these are being performed to treat avascular necrosis, a condition that occurs when the talus is fractured, loses blood supply and dies. “The ankle no longer functions correctly and it can be very painful. An option in that setting is to replace the talus with a metal one.” Although sometimes a fusion is still needed, the implant enables the patient to retain close to normal height—the talus is 2 to 3 inches high—and body alignment.

**Reconstruction for cancer patients**

Megan Anderson, MD, chief of Orthopaedic Oncology at BIMDC, also leverages the potential of 3D printing technology to treat her patients, primarily to reconstruct hips and other bones that have been affected by cancerous tumors. She first used 3D-printed prosthetics about three years ago, and has implanted them in five patients.

“I’ve used 3D printing mostly in our toughest anatomic area for tumor surgery, which is the pelvis. We cannot only rebuild the pelvis, we can have it match exactly the patient’s anatomy,” she explained. Similar to the process used to print the talus prostheses, Anderson orders CAT scans and securely sends them to a company specializing in 3D medical implants, which builds a model of the patient’s pelvis with specialized software.

“I tell the engineers what part of the pelvis I am going to remove—I actually draw it. They use that information to rebuild the 3D implant. Then we attach plates and screws to the implant to hook it into the remaining pelvis.” The prosthetic pelvis is made from cobalt chromium or titanium, materials that can withstand the forces placed on joints.

Cancer in the pelvic bone is fairly rare, and people who need cancerous pelvic bone removed have had few treatment options. The most common approach is a bone graft from another person. “Bone matching is challenging because everyone’s pelvis is built a little bit different,” Anderson explained. “Another option is an off-the-shelf metal replacement, but they’re not designed to replace the large sections of pelvis we remove and reconstruct.”

In some cases, the pelvis bone is not rebuilt. “Sometimes we have the hip basically not have a socket, which is obviously not ideal,” Anderson said.

The 3D-printed implant offers another choice. The high degree of customization possible with 3D printing provides patients with several benefits. “Because the implant is custom designed to fit into the patient’s pelvic anatomy, it decreases the OR time in a huge way,” said Anderson. “Plus, it works better because it matches exactly—you have better bony contact, a better hip joint.”

In addition, the personalized fit shortens recovery time. “The implant fits in so well the patient can get up and rehabilitate more quickly than waiting for an ill-fitting graft to heal,” said Anderson. The fact that the 3D-printed replacement is metal also speeds rehabilitation, because patients can put weight on it sooner than they can with a human graft.

“A core group of orthopaedic oncology surgeons is using 3D technology this way, but certainly it’s not available everywhere in the country,” Anderson said. “This is one of the few places where it has been done a few times and we feel comfortable with it.”

While the FDA has cleared hundreds of off-the-shelf 3D-printed implants for use in orthopedic applications such as knee replacements and cranial plates, those used by Miller and Anderson are provided through what is known as a custom device exemption. This regulatory pathway enables manufacturers to produce five of a particular device type in cases where there are no acceptable commercially available options for individual patients, making a better future possible for these patients.
OPIOID MISUSE continued from page 3

But when they separated U.S. data from non-U.S. data, they saw a slower rate in the growth of opioid misuse reported in the U.S. while international rates continued to climb. “It shows our collective effort here to reduce opioid addiction is promising,” said Mohamadi.

When the investigators looked more closely at the 4 percent of patients who continue to use prescription opioids beyond two months, they found two groups had a greater rate of opioid misuse: people who had taken opioids previously and those receiving workers’ compensation for their medical treatment.

“This information gives us insight into the problem. Pain is a complex medical phenomenon, mental and psychological factors can affect our response to it greatly,” Mohamadi said, pointing out that trauma like a car accident or fall is especially stressful. “If a person is hurt at work, they go to the hospital and have interventions, and obviously feel pain from their injury. Then they have the added stress of figuring out how to navigate the workers compensation system and support themselves and their families. Opioids may relieve the pain short-term, but do not always address the underlying causes such as depression and can have serious adverse effects like addiction. Patients may be self-managing their depression via side effects of the pain medications such as euphoria, leading to their overuse.”

The relationship between trauma and opioid misuse is also evident by another result of the literature review: chronic use of prescription opioids after elective surgery was 6 percent, but for trauma, it was almost triple at 16 percent.

Addressing the problem

“Depression is highly correlated with chronic post-surgical pain,” said Mohamadi. For people who had depression and chronic pain that was being managed with antidepressants or non-narcotic pain killers, those conditions did not appear to increase the probability of prolonged use of opioids. “Our findings suggest that addressing mental health problems and managing postsurgical pain using multiple modalities—including non-narcotic analgesics—could mitigate the risk of prolonged use of opioids associated with depression or pain.”

In addition to non-narcotic analgesics, postsurgical pain might be alleviated with medications for depression and anxiety, help from mental health professionals or mindfulness techniques.

One factor that may affect opioid prescribing and use is culturally accepted expectations about pain. “If someone has a broken bone, it’s not realistic to try for zero pain—it is almost impossible,” said Mohamadi. “As clinicians, we sometimes rely on medications excessively. Some patients, in spite of a safe amount of prescribed pain killers, will still have some residual pain, which can be managed by other strategies.”

Physicians could address these expectations and help lessen the occurrence of prescribed opioid dependence by involving patients in pain management planning that includes realistic goal-setting and providing them with understandable information about the risks of opioid use, the study authors suggest. Other approaches to mitigate opioid dependence include tapering opioid use before discharging the patient from the hospital and using more uniform prescribing protocols.

“Four percent may not seem like much; however, hospitals have reduced the rate of surgical site infections—another unwanted potential side effect of surgery—far below 4 percent,” said Mohamadi. “That demonstrates what’s possible with a concerted effort. Our data suggests much more effort is needed to mitigate the problem of prolonged opioid use.”

News and Notes

Publications

Mary Bouxsein, PhD, Center for Advanced Orthopaedic Studies, was a co-author of “Negative effects of long-duration spaceflight on paraspinal muscle morphology,” published ahead of print December 8, 2018, in SPINE.

Jacob Drew, MD, Sports Medicine, was lead author of “Contemporary perioperative analgesia in total knee arthroplasty: multimodal protocols, regional anesthesia, and peripheral nerve blockade,” published in The Journal of Knee Surgery August 2018 edition.

Presentations

This January, orthopaedic spine surgeon Umesh Metkar, MD, presented at a live surgery course for over 70 surgeons at the Indian Spinal Injuries Centre, New Delhi. The all-day program focused on Oblique Lateral Inter-body Fusion (OLIF), a rapidly growing technique in the management of spinal deformities that can be completed in a single surgery instead of two while reducing the risk of nerve damage.

Appointments and Grants

Tamara Rozental, MD, Chief of Hand Surgery, was appointed the inaugural editor-in-chief of the open access peer reviewed Journal of Hand Surgery Global Online or JHS GO. The new platform will present a spectrum of research in hand, upper extremity and microvascular surgery. The site launched its first issue in January.

Director of the Center for Advanced Orthopaedic Studies Mary Bouxsein, PhD, and Brian Snyder, MD, PhD, Boston Children’s Hospital, have been awarded an NIH grant of $2.4 million over five years to study whether estimating spinal loading could improve the current method (bone density) used to identify those at risk for vertebral fracture in a multiethnic sample of older adults. Dennis Anderson, PhD, also at the Advanced Center for Orthopaedic Studies, is a co-investigator on the study. The investigation kicked off in August 2018.