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NEWS

RSNA Press Release

Obesity Prevents Injections from Reaching Muscle

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At A Glance

- Most injections into the buttocks are not delivering the optimal level of drugs.
- The more fat there is in the buttocks, the less likely the needle will be able to reach the muscle with its rich blood supply helping to absorb the medication.
- Many medications are administered through injections into the buttocks, including painkillers, vaccines, contraceptives and anti-nausea drugs.

CHICAGO - Women may not be getting the most out of vaccines and other injections, according to a study presented at the annual meeting of the Radiological Society of North America (RSNA).

"Our study has demonstrated that a majority of people, especially women, are not getting the proper dosage from injections to the buttocks," said lead author Victoria O. Chan, M.B., registrar in the clinical medicine department of The Adelaide and Meath Hospital in Dublin, Ireland.

"There is no question that obesity is the underlying cause," Dr. Chan said. "We have identified a new problem related, in part, to the increasing amount of fat in patients' buttocks."

Many medications are administered through injections into the muscles of the buttocks, including painkillers, vaccines, contraceptives and anti-nausea drugs. The upper, outer quadrant of the buttock is the preferred site for intramuscular injections, because there are relatively few major blood vessels, nerves and bones in this region that could be damaged by the needle. Yet the rich supply of microscopic blood vessels in muscle speeds drug absorption into the system.

Intramuscular injections are a common alternative when patients cannot swallow oral medications, are fasting for a procedure or have a metabolic disorder that inhibits the absorption of orally ingested medication. The use of intramuscular injections has increased over the past 10 years, and new medications have been developed for delivery in this way. However, Dr. Chan's research has demonstrated a majority of these injections are largely ineffective.

"Our study has shown that 68 percent of intramuscular injections do not reach the muscles of the buttock," Dr. Chan said. "The amount of fat tissue overlying the muscles exceeds the length of the needles commonly used for these injections."

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Pharmaceutical companies design medications so that the proper dosage is absorbed into the blood stream from the muscle. Because fat tissue has significantly fewer blood vessels relative to muscle, less of the medication is absorbed into the blood stream and delivered to the appropriate part of the body. "This results in the patient either not receiving the maximum benefit of the drug or receiving no benefit at all, because the drug levels are insufficient to have any effect," Dr. Chan said.

Furthermore, if the medication is not absorbed into the blood stream, it remains in the fatty tissue where it can cause local infection and irritation.

Dr. Chan and colleagues recruited 50 patients scheduled for computed tomography (CT) exams of the abdomen or pelvis. The patient group was equally divided among men and women, ranging from 21 to 87 years old.

Prior to the CT exams, patients were given intramuscular injections with the addition of a small air bubble into the upper quadrant of the buttocks using a standard-size needle. The researchers analyzed the CT images to determine the location of the air bubble and also measured body mass index, distance to injection site and thickness of fat and muscle.

The overall success rate of the injections was 32 percent. The success rate among men was 56 percent, while the success rate among women was only 8 percent, meaning 23 of 25 women did not receive injections into the muscle. Compared to men, women typically have a higher amount of fat in their buttocks. Dr. Chan proposes that a longer needle length is required to increase the success rate of intramuscular injections. "The more fat tissue there is in the buttock, the less likely the needle will reach the muscles underneath that fat," Dr. Chan said.

Co-authors are Jane Colville, M.B., Orla Buckley, M.B., Samuel Hamilton, M.B., Thara Persaud, M.B., and William Torreggiani, M.B.

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