

Gender Related Issues in Gluteal Intramuscular Injections

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Abstract

Background

Gluteal intramuscular injection of octreotide LAR is effective for control of carcinoid syndrome and delay tumor growth in midgut carcinoid tumors. However, many intended gluteal intramuscular injections are delivered subcutaneously which may lead to altered pharmacokinetics and suboptimal therapeutic outcome. We examine gender related issues in gluteal intramuscular injection.

Methods

Patients receiving intramuscular injection of octreotide LAR at the Gastrointestinal Center, University of Texas M. D. Anderson Cancer center were identified. Pelvic CTs were reviewed for evaluation of injection success and measurement of injection depth, skin to muscle depth.

Results

251 intended intramuscular injections between 12/21/2005 and 6/25/2008 were evaluable by CT. Among these, 119 (47%) were given to males; 132 (53%) were given to females. 105 (42%) were associated with subcutaneous nodules indicating subcutaneous placement; 146 (58%) were deemed successful intramuscular injection. Successful intramuscular injection rate was lower in females (42% vs 78%; $P < 0.001$). Female had lower BMI (mean, 26.6 vs 28.8; $P = 0.008$), but greater skin to muscle depth at optimal injection site (mean, 34 vs 24 mm; $P < 0.001$). BMI correlated linearly with skin to muscle depth ($P = 0.001$). Among those with failed intramuscular injections, depth of needle placement was deeper among females (mean, 30 vs 25 mm; $P = 0.002$). Self reported nursing experience level affected success rate of gluteal intramuscular to a greater degree among females compared to males (see table).

Conclusion

Gluteal intramuscular injection is more difficult in females due to greater skin to muscle distance despite lower BMI. Increased nursing education and introduction of longer needle are needed.

Background

- Injection related subcutaneous nodules are commonly observed on pelvic CTs among patients receiving octreotide LAR. This suggest many such intended gluteal intramuscular (IM) injections are delivered subcutaneously.
- Anecdotal reports from patients included differences in symptoms from month to month which they related to injections technique.

Objective

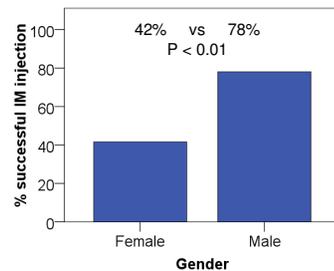
- Evaluate gluteal IM injection success rate among patients receiving octreotide LAR
- Evaluate gender related factors associated with successful gluteal IM injection

Methods

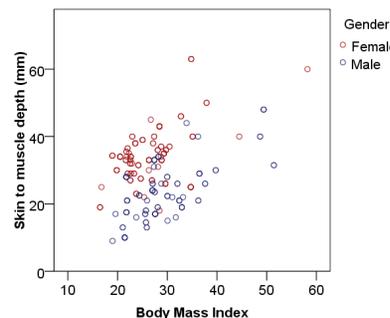
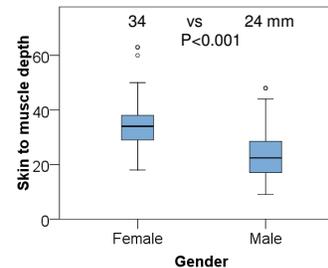
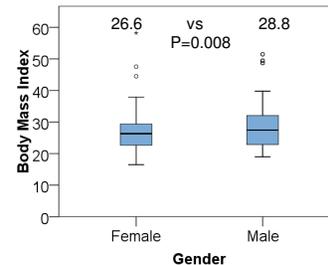
- Gender, height, weight, body mass index (BMI) were collected from patients receiving octreotide LAR injection
- Pelvic CTs were reviewed for evaluation of injection success.
- CT measurement of injection depth, and skin to muscle depth were performed
- CT measurements of bony landmarks were performed
- CT evaluator also gave inference to reason for any miss: too cranial, lateral, caudal, and insufficient needle length.

Results

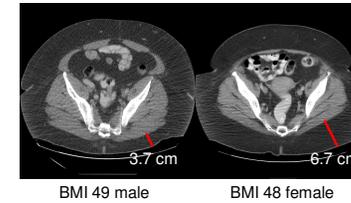
- 251 intended intramuscular injections between 12/21/2005 and 6/25/2008 reviewed
 - 119 (47%) given to males
 - 132 (53%) given to females
 - 105 (42%) were subcutaneous
 - 146 (58%) were intramuscular
- Male patients had fewer subcutaneous injection nodules than female patients



- Female had lower BMI
 - mean, 26.6 vs 28.8; $P = 0.008$
- Female had greater skin to muscle depth at optimal injection site
 - mean, 34 vs 24 mm; $P < 0.001$.
- BMI correlated linearly with skin to muscle depth ($P = 0.001$).



Skin to muscle depth greater at similar BMI



Nursing experience and IM success rate

Self-reported parameter	IM success rate		P*
	Female	Male	
Experience with IM injection			
Moderate	33%	75%	0.001
Very	53%	73%	0.015
Comfort with LAR injection (scale 1-10)			
1-9	23%	66%	<0.001
10	68%	81%	0.135

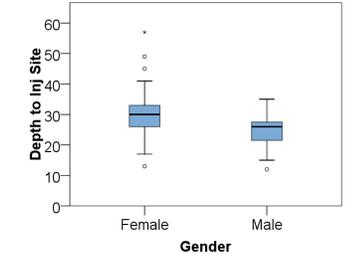
Self reported nursing experience level affected success rate of gluteal intramuscular to a greater degree among females compared to males.

Landmark measurements by gender

Landmarks	Female mm (SD)	Male mm (SD)
Bony		
GT-GT*	304 (19)	329 (22)
GT-PSIS	108 (18)	110 (12)
GT-Ideal	70 (11)	66 (11)
PSIS-Ideal	39 (15)	44 (11)
GT-Coccyx*	24 (16)	16 (9)
Bone-Skin		
GT-Skin*	68 (19)	54 (2)
Skin-Sciatic Nerve Plane	61 (13)	56 (12)

GT, greater trochanter; PSIS, posterior superior iliac spine to greater trochanter
* $P < .05$

Depth of injection among missed injection cases by gender



Reason for missed injection by gender

	Female N = 79	Male N = 25
Too Lateral	6 (8%)	5 (20%)
Too Cranial	32 (41%)	5 (20%)
Too Caudal	7 (9%)	2 (8%)
Insufficient penetration	25 (32%)	12 (48%)
Insufficient needle length	9 (11%)	1 (4%)

Conclusion

- Gluteal intramuscular injections are more difficult in females due to greater skin to muscle distance despite lower BMI when compared to males.
- This is also effected by the self reported comfort levels and experience by the nurses. Increased nursing education is needed.
- Introduction of longer needles are needed to produce a higher percentage of successful intramuscular injections.