Preoperative Hypoglycemia Increases Infection Risk Following Trigger Finger Injection and Release

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To determine the effects of pre-procedural glycemic levels have on the complications rates, namely infection rates, following trigger finger injection or release.

BACKGROUND

- Trigger finger (TF) is a common condition with a lifetime incidence reportedly of 2.6%, reaching as high as 10% in patients with diabetes.
- Common treatment modalities include OTC NSAIDs, splints, steroid injections, or surgical release of the A1 pulley.
- Most commonly reported complications include: recurrence, flexion contracture, bowstringing, digital nerve injury, and infection.
- Diabetes is a well-known risk factor for infection following TF injection and/or release.
- The effects of perioperative hypoglycemia on TF injection/release have not been reported, to date.

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METHODOLOGY/RESULTS

- Retrospective review of a national private payer database within the PearlDiver Supercomputer (Warsaw, IN) for patients undergoing TF injection or release between 2007-2015.
  - ICD-9 code 727.03 and CPT codes 20550/26055 were used to identify patients
  - ICD-9 codes were used to capture infections at 90-day and one-year post-procedure (Fig. 1)
- 153,479 TF injections were identified.
  - Statistically significant increase in infection rate found in patients with fasting glucose levels <70 mg/dL within first 90-day (p<0.01) and 1-year (p<0.001) post-injection time intervals (Table 1)
- 70,290 TF releases were identified.
  - Statistically significant increase in infection rate in patients with fasting glucose levels <70 mg/dL within first 1-year (p<0.005) post-release time interval (Table 2)

STATISTICAL ANALYSES

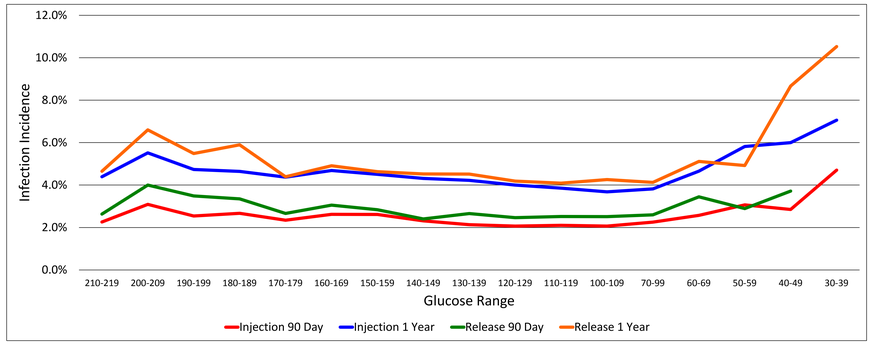

Figure 1.
Infection incidence following trigger finger injection or release. Glucose ranges for each patient were identified using Logical Observation Identifiers Names and Codes (LOINC). The usable ranges were from 20 mg/dL to 219 mg/dL in increments of 10 mg/dL. These glucose levels were filtered for the day of procedure.

Glucose Range	Injection (n)	90 Day Infection Rate	Incidence (90-day time interval)	1 Year Infection Rate	Incidence (1-year time interval)
210-219	2345	53	**2.3%**	103	**4.4%**
200-209	2847	88	**3.1%**	157	**5.5%**
190-199	3379	86	**2.5%**	160	**4.7%**
180-189	3897	104	**2.7%**	181	**4.6%**
170-179	4780	112	**2.3%**	209	**4.4%**
160-169	5803	152	**2.6%**	272	**4.7%**
150-159	6966	182	**2.6%**	314	**4.5%**
140-149	8854	205	**2.3%**	382	**4.3%**
130-139	10889	232	**2.1%**	460	**4.2%**
120-129	13944	288	**2.1%**	558	**4.0%**
110-119	19022	400	**2.1%**	733	**3.9%**
100-109	26452	546	**2.1%**	974	**3.7%**
70-99	38044	857	**2.3%**	1452	**3.8%**
60-69	3695	95	**2.6%**	172	**4.7%**
50-59	1564	48	**3.1%**	91	**5.8%**
40-49	667	19	**2.8%**	40	**6.0%**
30-39	255	12	**4.7%**	18	**7.1%**
20-29	76	-1		-1	
Total	**153479**	**3479**	**2.3%**	**6276**	**4.1%**

Table 1. Infection rate following trigger finger injection for 90-day and one-year time intervals (-1 indicates an n<11).

Glucose Range	Release (n)	90 Day Infection Rate	Incidence (90-day time interval)	1 Year Infection Rate	Incidence (1-year time interval)
210-219	1291	34	**2.6%**	60	**4.6%**
200-209	1499	60	**4.0%**	99	**6.6%**
190-199	1749	61	**3.5%**	96	**5.5%**
180-189	2002	67	**3.3%**	118	**5.9%**
170-179	2367	63	**2.7%**	104	**4.4%**
160-169	2851	87	**3.1%**	140	**4.9%**
150-159	3452	98	**2.8%**	160	**4.6%**
140-149	4113	99	**2.4%**	186	**4.5%**
130-139	5004	133	**2.7%**	226	**4.5%**
120-129	6334	156	**2.5%**	265	**4.2%**
110-119	8380	211	**2.5%**	343	**4.1%**
100-109	11533	290	**2.5%**	491	**4.3%**
70-99	16868	438	**2.6%**	696	**4.1%**
60-69	1682	58	**3.4%**	86	**5.1%**
50-59	691	20	**2.9%**	34	**4.9%**
40-49	323	12	**3.7%**	28	**8.7%**
30-39	114	-1		12	**10.5%**
20-29	37	-1		-1	
Total	**70290**	**1887**	**2.7%**	**3144**	**4.5%**

Table 2. Infection rate following trigger finger release for 90-day and one-year time intervals (-1 indicates an n<11).

DISCUSSION

- Diabetes has been well documented as a risk factor for infection following surgical procedures; however, hypoglycemia is perhaps one of the most dreaded complications encountered amongst this patient population.
- The rate of infection following TF injection or release is not well documented within the current literature.
  - Hypoglycemia symptoms can vary widely and have been shown to increase mortality risk by 6-fold and increase overall medical care costs
  - Hypoglycemia has been linked to increased risk of bacterial sepsis and severe infections
- A single episode of hypoglycemia has been linked to hypoglycemia-associated autonomic failure and recurrent iatrogenic hypoglycemia.
  - Recurrent hypoglycemic episodes may lead to late surgical site infections, thereby explaining an increased incidence of infections up to 1-year after the index procedure
- Complications after trigger digit release were assessed for a 90-day and 1-year postoperative period.
  - 90-day period was chosen to reduce risk of generic ICD-9 codes for post-op complications were related to a subsequent surgical procedure
  - 1-year period was chosen to capture additional complications that may have occurred outside of the 90-day window
- Pearldiver database allows for the capturing of a complication to be linked directly to the index procedure.
  - Specific ICD-9 codes used: ICD-9-D-68100 (cellulitis/abscess of finger, unspecified), ICD-9-D-6819 (cellulitis/abscess of unspecified digit), ICD-9-D-71104 (pyogenic arthritis hand), ICD-9-D-71194 (unspecified infective arthritis, hand), and ICD-9-D-99851 (infected postoperative seroma)
- We postulate that preoperative hypoglycemia, as a single measure, may contribute to surgical site infections via two mechanisms:
  - Hypoglycemia may be a marker of impaired glucose tolerance, with an overall decreased capacity to mount an immune response against pathogens
  - A single episode of hypoglycemia may lead to recurrent hypoglycemic episodes that further increase the risk of infection
- Pre-procedural hypoglycemia is a risk factor that can lead to post-procedural infections in patients undergoing TF injections or surgical releases.
  - Most factors that cause hypoglycemia in perioperative patients are modifiable, requiring educational and not pharmacological interventions
  - Timely detection and prevention of hypoglycemia preoperatively is essential to prevent increased morbidity from surgical procedures

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