Direct Oral Anticoagulants
Use in the Setting of Bariatric Surgery and Feeding Tubes

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Bariatric Surgery

FIGURE 1 – Types of Bariatric Surgery

A. Adjustable gastric banding (AGB):
Adjustable silicone band placed around stomach to create a smaller pouch.

B. Roux-en-Y gastric bypass (RYGB):
Stomach stapled to form gastric pouch that connects to distal jejunum, excluding the duodenum and proximal jejunum.

C. Gastrectomy (partial or total):
Sleeve gastrectomy results in longitudinal resection of 80% of stomach.

D. Bilipancreatic diversion with duodenal switch (BPD-DS):
Gastric pouch reattached more distally to terminal ileum resulting in considerable reduction in absorptive surface and more significant malabsorption.

TABLE 1 – DOAC Absorption Locations

<table>
<thead>
<tr>
<th>DOAC</th>
<th>Absorption Location</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apixaban</td>
<td>55% in distal small bowel and some proximal colon; some gastric and proximal small intestine</td>
<td>pH independent absorption</td>
</tr>
<tr>
<td>Dabigatran</td>
<td>Lower stomach and duodenum</td>
<td>Prodrug requires acidic environment for absorption (formulated with tartaric acid) *20% reduction was seen when given with antacids, however this is thought to be clinically insignificant.</td>
</tr>
<tr>
<td>Edoxaban</td>
<td>Proximal small intestine</td>
<td>pH dependent solubility</td>
</tr>
<tr>
<td>Rivaroxaban</td>
<td>Primarily stomach with reduced absorption in the proximal and small intestine</td>
<td>20mg and 15mg tablets must be taken with a sufficient calcic intake; following bariatric surgery, most patients must adhere to a caloric restriction</td>
</tr>
</tbody>
</table>

Surgical Intervention

<table>
<thead>
<tr>
<th>Surgical Intervention</th>
<th>Apixaban</th>
<th>Dabigatran</th>
<th>Edoxaban</th>
<th>Rivaroxaban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total and Partial Gastrectomy</td>
<td>PR</td>
<td>PR</td>
<td>PR</td>
<td>PR</td>
</tr>
<tr>
<td>RYGB</td>
<td>PR</td>
<td>PR</td>
<td>UA</td>
<td>UA</td>
</tr>
<tr>
<td>Distal Resection and SBS</td>
<td>PR</td>
<td>UA</td>
<td>UA</td>
<td>UA</td>
</tr>
<tr>
<td>Colectomy</td>
<td>PR</td>
<td>UA</td>
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</table>

Take Home Points

A. There is minimal evidence regarding the use of DOACs in patients with a history of bariatric surgery. Thus, warfarin remains the preferred oral anticoagulant in this patient population as effectiveness can be measured through INR monitoring.1-2

B. Rivaroxaban should be used with extra caution due to the caloric restrictions associated with gastric bypass; as well as reduction in plasma levels as seen in observational studies.2

C. If a patient is unable or unwilling to use warfarin, it is important to consider type of bariatric surgery, location of DOAC absorption, pH dependent/independent solubility, transporter mechanisms and to conduct shared decision making prior to initiating DOAC therapy.

D. Dabigatran and edoxaban are not recommended for administration via enteral feeding tubes. Rivaroxaban and apixaban can be administered via enteral feeding tubes if terminated in the stomach (nasogastric or gastric tubes).

References:

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Feeding Tubes Examples

Apixaban: Bioavailability is also reduced if administered distal to the stomach. It is recommended to avoid in conjunction with food. Can be given in 80mL DSW. Flush tube is also preferable.1 Enteral Apixaban is more impacted in presence of nutritional supplementation compared to enteral Rivaroxaban.2

Dabigatran: must be taken orally and should not be administered through an enteral feeding tube.3

Edoxaban: no studies have been conducted to assess edoxaban use in enteral administration therefore it should be taken as an intact tablet.4

Rivaroxaban: Bioavailability is reduced if administered distal to the stomach. It is recommended to flush tubing prior to and after administration. Can be given in 50mL sterile water, applesauce, or juice.5