The Pelvic - Saddle Interface

Steven Carre - Bike Effect

What I hope to cover today:

• Basic anatomy of the pelvis and understanding of the pelvic - saddle interaction
• Common ground / Common sense agreements
• Common problems
• Influencing factors
• Solutions to common issues
• How to obtain objective data
• Don’t lose sight of the forest for the trees
Why do clients get a bike fit?

• Pain vs. Absence of pain (how much pain is "normal")
• Foot issues
• Knee issues
• Saddle issues
• Low back issues
• Neck and/or shoulder issues
• Hand issues
• Increase performance

Relevance of contact points

• Discomfort while cycling
  90% of ambitious rider complain of discomfort on the bike

Source: Frobose, Lücker, Wittmann, Cologne 2001
The Perfect Saddle

If I asked everyone in here what the one perfect saddle is, I would probably end up with a very wide variety of answers.

Basic Anatomy of the Pelvis

- Ischials, Ischiums, Ischial tuberosities (sit bones)
- Pubic Rami
- Pubic Symphysis
- Infrapubic angle / subpubic angle
- Sacrum / SI joints
- ASIS / PSIS / Iliac crest
- Pudendal Nerves and Arteries
Male vs Female Pelvis

Most significant change is in the infrapubic angle, which in turn affects both the ischial tuberosity spacing as well as the potential pressure on the pudendal nerves and arteries.

What makes choosing the right saddle so important?

- We only contact the bike in three main places: pedals, bars, saddle. (Left pedal, right pedal, left side of bars, right side of bars, left rear of saddle, right rear of saddle, front of saddle).

- The majority of your body weight is supported by the saddle.

- If it’s not on the saddle, it will increase pressure on the hands.

- Systemic part of the fit process. It affects everything else. It’s hard, if not impossible to get a great fit result if the saddle interaction is poor.

- Stability - You can’t fire a cannon from a canoe. Metabolic cost to simply riding the bike. (Lower vs. higher gas mileage).

- Comfort - If the client isn’t comfortable on the saddle, they don’t want to ride. If clients aren’t riding, they aren’t getting a bike fit or purchasing bikes, etc.
Common Ground Goals

- Provide comfort
- Provide stability
- Provide control for steering
- Distribute pressure mainly toward the skeletal structure and away from soft tissue
- Not impede pedaling mechanics
- Not cause other issues (chafing, saddle sores, etc.)

Common Problems

- Subjective discomfort
- Saddle sores
- Chafing, raw skin
- Lumps, bumps, cysts (feel like a pea under the skin)
- Numbness
- Difficulty urinating after a long ride
- Abcess
- Rash
- Hot spots of high pressure
Influencing Factors

How many can you get?

• Where they are contacting saddle
• Saddle width
• Saddle shape front to back (flat or hammock)
• Saddle shape side to side (flat or dome)
• Saddle cutout, channel, etc.
• Saddle padding
• Saddle topcover material (slippery or not)
• Saddle height
• Saddle fore-aft (setback)
• Saddle tilt (front to back)
• Saddle to handlebar reach
• Saddle to bar drop
• Saddle rotation (seatpost)
<table>
<thead>
<tr>
<th>Ischial tuberosity spacing</th>
<th>Type of riding (road conditions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrapubic angle</td>
<td>Power produced during riding</td>
</tr>
<tr>
<td>Childbirth</td>
<td>Terrain (climbing / descending)</td>
</tr>
<tr>
<td>Chamois shape</td>
<td>Hand position on bars</td>
</tr>
<tr>
<td>Chamois width</td>
<td>Bodyweight</td>
</tr>
<tr>
<td>Chamois thickness</td>
<td>Stance width (Q-Factor)</td>
</tr>
<tr>
<td>Chamois placement in shorts (sewn in location)</td>
<td></td>
</tr>
</tbody>
</table>

| Saddle wear/breakdown     | Saddle stitching                  |
| Pelvic obliquity / Rotation | Leg length difference            |
| Spinal rotation / scoliosis | 33 total!                        |
| Flexibility (esp. hamstring and lumbar) | Plus other pre-existing musculoskeletal dysfunctions |
| Pain/discomfort           | |
Riding on the Rivet

• Not how saddles are designed for a pelvis to interact with
• Saddle height too high
• Saddle positioned too far rearward
• Saddle to handlebar reach too far
• Saddle to handlebar drop too great
• Saddle tilted nose-down

Common Solutions

• Correct saddle height to ensure the ability to stay in the ideal position on the saddle.
• Correct saddle setback to ensure the ability to stay in the ideal position on the saddle. (If they’re sliding forward, why not just put the saddle there?)
• Correct saddle to handlebar reach to ensure the client isn’t “chasing” the handlebars. Their “go to” hand position will tell you a lot.
• Correct saddle to bar drop to ensure that they’re not sliding forward on the saddle in order to keep the hip angle open at the top of the pedal stroke. (Have them unclip one leg and pedal backwards).
• Level saddle (or relatively minor saddle tilt).
Stance Width

- Most pedals are the exact same width for a person that is 5’1” and a person that is 6’4”.

- Internal or external tibial torsion (pigeon toed or duck footed) is a significant factor and is easily looked at off the bike.

- Can be affected by pedal choice, cleat medial-lateral positioning, pedal washers, pedal extenders, or longer pedal spindles.

- Greatly affects the comfort on the transition area of the saddle for those that need it.

Chamois Width, Quality, and Placement

- Many cyclists are not sitting on the actual thicker part of the chamois and are completely unaware of it until it is pointed out.

- Very common with inexpensive team kits.

- Incredibly common with Women’s bibs / shorts.

- Sometimes solving a client’s saddle issues are simply a matter of getting them to change their bibs.

- Endura: three different chamois widths for the same bib shorts.

- Machines For Freedom: Women’s specific clothing with unique chamois design and placement.
Common Solutions
Accomodate vs. Rehabilitate

Pelvic Obliquity

- Accomodate: Saddle that matches the obliquity. SQ Lab produces a saddle that pivots in the middle of the saddle. Some dome-shaped saddles also work for this.

- Rehabilitate: PT
Functional LLD

• Accomodate: Shim functionally shorter leg to get more symmetrical saddle pressure
• Rehabilitate: PT

Spinal Twist/Rotation (Scoliosis)

• Accomodate: Double or Triple wrap bars asymmetrically to affect a change at the pelvic / saddle interface.
• Rehabilitate: PT to address the driving factors. Could be a range of factors.
General Saddle Guidelines

- Flatter profile front to back (as opposed to hammock shaped)
- Relatively flatter profile side to side (as opposed to heavily dome shaped)
- Proper width for the individual’s unique pelvis to allow the pelvis to create a “bridge” on the saddle in order to reduce soft tissue pressure.
- Some type of cutout/channel/softer density foam to further reduce pressure on the pudendal nerves and arteries.

Tri / TT Positioning

- In an aggressive aero position, the pelvis is rotated forward so much that the pressure moves to the Pubic Rami as opposed to the Ischial Tuberosities.
- The same general concept of putting the pressure on the skeletal structure and not loading the soft tissue, nerves, and arteries still applies.
- This is done through a different type of saddle. The two most popular are the Cobb and Adamo saddles.
- Saddle nose width becomes a significant factor.
Objective Data

- Pressure Mapping
- Penile blood/oxygen saturation levels through direct arterial sampling (indwelling catheter) or Transcutaneous Oxygen Monitoring
- MRI (loaded vs. unloaded)
- DITI (Digital Infrared Thermal Imaging) or FLIR (Forward Looking Infrared Radiometer)
- Feel saddle with hand for heat signature
- Palpate ischial tuberosities (where in relationship to saddle as well as chamois placement)
- Look at saddle for uneven wear / breakdown

Saddle pressure mapping

gebioMized

Saddle and foot pressure mapping system. Price depends on the level of the system. Changes the interaction with client on a foundational level.
Bike Fit Systems

SwitchIt Rapid Saddle Changer and Tilt Adjuster

$865

It is a common misconception to think that you need to ride for hours to tell the difference between a good saddle and a bad one.

FLIR for iOS / Android

FLIR ONE for iOS
For Apple products with a lightning connector

$249.99

BUY NOW
What’s Next?

• Saddles with built in pressure meters to show you saddle pressure directly on your Garmin or phone?

• Saddles that tell you when they need to be replaced?

• ?

Thank You!

Any Questions?