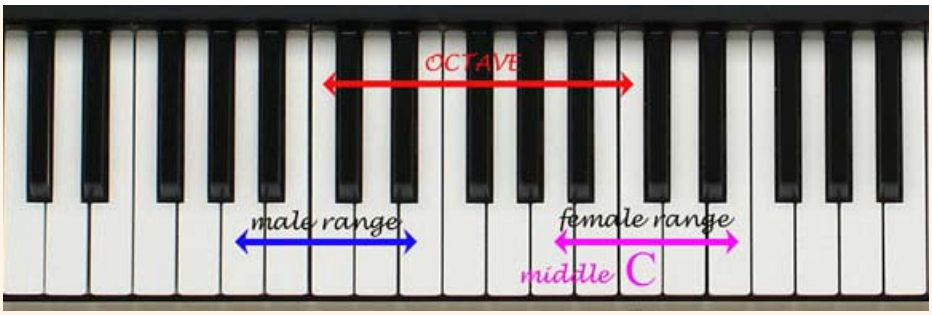
# Voice Feminization

Transgender voice changing, which is also known as feminization laryngoplasty is a complicated process that requires three factors to achieve success. A strong understanding of the process will give you the greatest chances of achieving a voice that sounds natural and is perceived as female by others. Surgery to raise the pitch of the voice is relatively straight forward in most patients *in experienced hands*. Having the final voice perceived as being female, versus just a higher pitched male voice, goes well beyond pitch-raising surgery. The first step is understanding the differences between "pitch" versus "voice" versus "speech." The vocal cords are simply ‘sound generators’. Pitch is the rate at which the vocal cords vibrate, and determines the frequency of a sound produced. Pitch is essentially ALL that the voicebox (larynx) does. The pitch at which we speak is called the speaking fundamental frequency (SFF) and the array of pitches that our larynx can produce is range. An untrained male voice usually has a little over an octave of range, which are 12 notes on a piano. Voice is what results as we mold that sound. Voice is shaped by the size and shape of our throats, mouth, nose and sinuses, giving it resonance, just like the size and shape of a piano gives that sound character. The "voice" or sound of an upright piano would sound different than that of a concert grand piano even if the same note is being played. It is important to understand that the resonators of your voice, the shape of the throat, mouth, and sinuses, *can not* be changed in feminization laryngoplasty. Even gender reassignment surgery and/or facial feminization cosmetic surgery can not change these resonators. Assessing these areas pre-operatively are vital to predicting how the voice might sound, and be perceived, afterwards.

Next, voice is shaped into words and sentences. This is speech. A genetic female uses a different part of the brain to produce speech than a genetic male, and has a certain sing-song quality called prosody. Prosody is why the brain of someone listening to you will *subconsciously* perceive the voice as being female versus a high-pitched male voice. (Visual cues are also very important, but for the purposes of this discussion, visual cues are assumed absent, such as during telephone conversation). Prosody *can not* be changed with hormones or surgery. It must be learned, the way an actor would acquire the skills to take on another's personality of sorts. It requires a speech therapist who is very, very experienced in transgender voice changes. For most, years of practice are required to perfect female prosody and have it sound natural and effortless. Perfecting female prosody  is 50% of the final result. This is why a genetic female with a very low speaking voice is still perceived as female, even when in the male speaking fundamental frequency (such as many female television reporters).



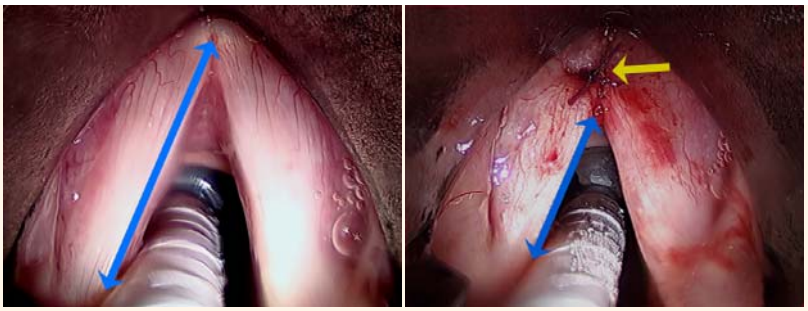

The average female speaking fundamental frequency is right around middle "C" on a piano (the normal range is within the pink arrows). The average male SFF is in a range about an octave lower than female, within the blue arrows in the picture. An octave is 12 notes on the piano (including the black keys!). **EXAMPLE**

In the Center, pitch can be raised 2/3 of an octave, or 8 notes, on average and in most cases. Some patients may get as little as 1/2 of an octave (6 notes) and others more than a full octave (12-14 notes). The goal, however, is to end up with a SFF in an appropriate part of the normal female range. There are many things that help predict the degree of expected pitch elevation, such as whether you ever smoked; have vocal fold polyps or scarring from voice abuse; limited range to begin with; age, or a shorter, fatter neck. In general, the lower your voice starts, the lower you will likely end up. A thorough pre-operative, in-person evaluation will help predict the degree the voice could be raised under ideal conditions. Please review the FAQs below.

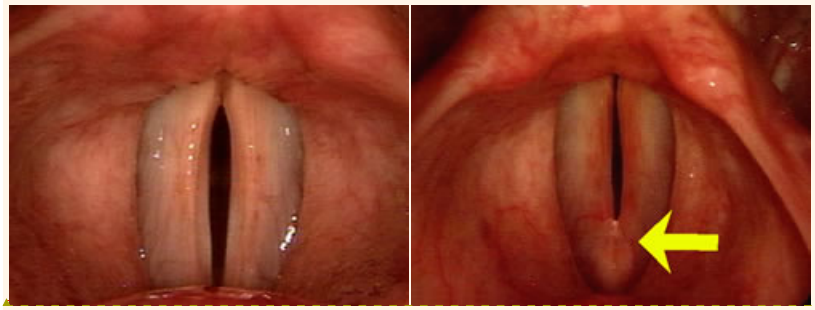
If you look at a real piano, the higher notes have the shorter, thinner, tighter strings. This is what feminization laryngoplasty aims to achieve with your vocal cords. There are several surgical techniques available, alone or in combination, to achieve the purpose of shorter, tighter and thinner vocal cords aiming for a SFF within the normal female range. These include techniques that are endoscopic ('through-the-mouth') and open ('with an incision').

## "Minimally-Invasive" Feminization Laryngoplasty
## Endoscopic Suture Glottoplasty
## Laser-Assisted Vocal Fold Webbing
## Anterior Commisure Retrodisplacement

These are different terms for shortening the vocal cords via an endoscopic, minimally-invasive, laser-assisted procedure, which can be done as a stand-alone surgery, or with a Crico-Thyroid Approximation, and/ or thyroid chondroplasty, a "triple", described below. The terms are descriptive and essentially synonymous in intent, which is to shorten the functional length of the vocal cord, thereby raising the pitch. The laser assists in controlling the degree of webbing, as well as the amount of anterior commisure retrodisplacement, and the final length of the vocal cords.



INTRA-OPERATIVE pre and post views of the minimally-invasive, laser-assisted glottoplasty. Notice how much shorter is the functional length of the post-op vocal folds (blue arrow) on the right. The yellow arrow marks the suture. The suture will dissolve in 3 months, however, the vocal fold shortening is considered permanent and irreversible.



CLINIC images before, and 6 months after glottoplasty alone. Notice the controlled webbing where the yellow arrow is pointing, and that the suture has dissolved. (Note: images in the clinic are flipped 180 degrees from those in the operating room.)

PROS of endoscopic feminization (glottoplasty) laryngoplasty ***alone***?

- No incision in the neck
- Pitch is still raised 75 hz, 7-7½ semitones, or just under ⅔ of an octave ***on average***
- Less time in the O.R., therefore less expensive
- More dynamic range, important for those who sing

CONS of endoscopic feminization (glottoplasty) laryngoplasty ***alone***?

- Less pitch elevation in former smokers, or those with low pre-operative SFF
- Procedure shortens vocal cords, but can not stretch, tighten or thin (think rubber band)
- More of the natural lower range is preserved, undesirable to some clients
- Can not perform thyroid chondroplasty ("tracheal shave") endoscopically

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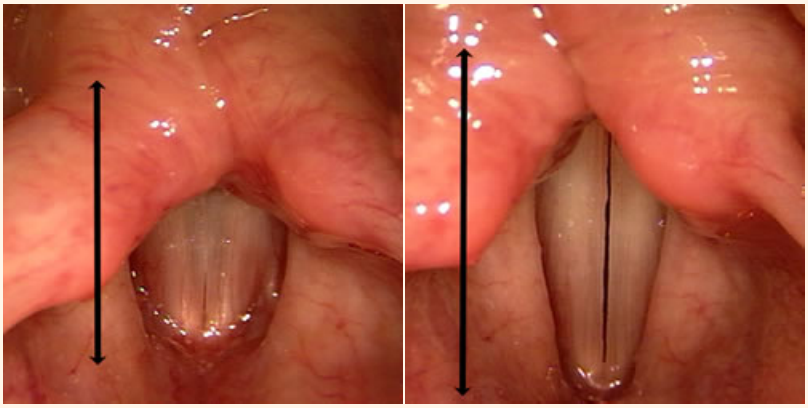
# “Open” Feminization Laryngoplasty
# Crico-Thyroid Approximation
# “CTA”



The vocal cords are stretched and thinned by making a small incision in a skin crease in your neck and tightening the cartilages that now allow you to go from a regular to a falsetto voice. A “CTA” mimics contraction of the “singer’s muscles”, the crico-thyroids. When contracted the cricothyroids raise the pitch the way you could now if you engage your falsetto or “mixed” voice. Through the same incision and at the same setting I can shave the Adam's Apple, a procedure termed thyroid chondroplasty (aka tracheal shave). If you have had prior facial feminization with a “tracheal shave”, the tracheal shave would need to be re-done (see FAQ) if you have a CTA. The neck incision is about 2-3 inches long and is hidden as best as possible in a skin crease. Notice in the before and after pictures above how much thinner and more taut the vocal cords become. A CTA can be done with or without the thyroid chondroplasty, but is only very very rarely done alone without the endoscopic portion. Average pitch elevation with a CTA + endoscopic feminization is 80-85 hz ,8-8½ semitones, or > ⅔ of an octave ***on average.***

PROS of the CTA added to the endoscopic glottoplasty?

- Recommended in former smokers, and/ or those with low pre-operative SFF
- Raises pitch more effectively and higher than the endoscopic procedure alone
- Stretches and thins the vocal cords, in addition to shortening their functional length
- Better eliminates the lower baritone range

CONS of the CTA added to the endoscopic glottoplasty?

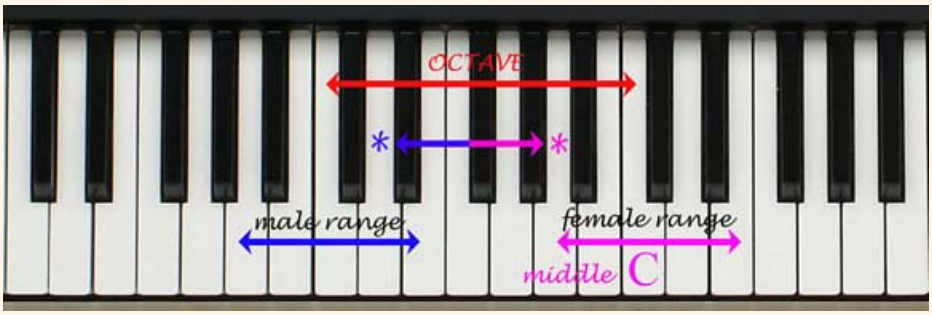
- Speech is somewhat more effortful for the first few months
- Incision takes 6 months to mature. Longer if a prior tracheal shave had been done
- Takes longer in the O.R., therefore more expensive
- Not recommended in those where the singing voice is very important, decreases lower range

# Questionnaire

Please fill out the medical and voice questionnaire E-MAIL at the top of the page if you have questions or concerns regarding which procedure(s) is/are best for you, of if you are or ever were a smoker, or have a chronic medical condition such as diabetes, take blood thinners, or ever had surgery on your vocal cords (for any reason).

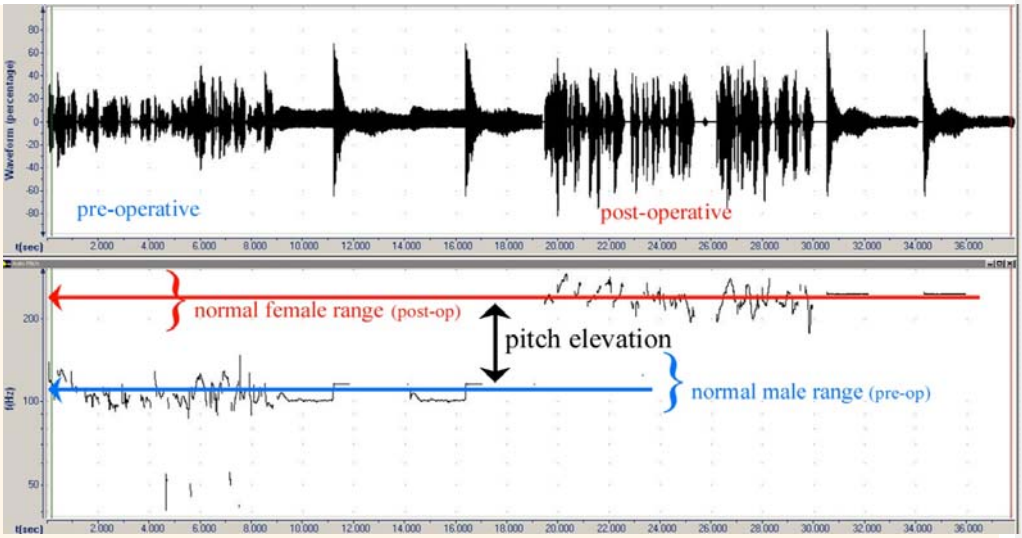
# Examples

The following two examples represent an AVERAGE result in a TYPICAL client. These examples aim to provide potential clients with *realistic*, *achievable* and *reasonable* expectations.




**A typical example:**

The patient's speaking fundamental frequency is centered on D in the male range * 3 months after feminization laryngoplasty, the pitch is centered at A in the female range * which is 2/3 of an octave higher, or 8 notes, which is average. **EXAMPLE**




**A second typical example:**

This time using acoustic analysis on a different patient; pre-operatively the speaking voice is centered around 110 hz, or A3 on a piano, middle average for a biologic male. Post-operatively the voice is now nicely centered around 240 hz, or C4 "middle C" in the center of the female range, representing more than an octave of pitch elevation. The goal was not for maximal pitch elevation, but for a final result that sounds natural and as close to or within the female range as would be suitable for one's body size and baseline anatomy. **EXAMPLE**

# FAQ

## Terms:

| | |
|---|---|
| Glottoplasty? | A: Type of laryngoplasty, except that only the vocal cords are operated, versus "laryngo"plasty, in which the entire larynx (=voicebox) is operated. |
| CTA? | A: Crico-Thyroid Approximation (also called subluxation). Using an incision in the neck to suture the two main cartilages together with non-absorable (*non*-metallic) sutures to raise pitch by stretching the vocal cords the way the "singer's muscles" do physiologically. |
| Thyroid chondroplasty? | A: Shaving the "Adam's Apple", also known as a "Tracheal Shave", although this term is a misnomer, as no part of the trachea is *ever* shaved, only the larynx. |
| "Triple" | A: Using minimally-invasive glottoplasty, as well as a CTA to raise pitch, and perform a thyroid chondroplasty at the same time. |

## COST:

All of the feminization procedures come packaged to include the cost of the surgery, pre-operative consultation, all post-operative visits, ALL hospital charges for *outpatient surgery* (see below regarding chaperones), all associated anesthesia fees, as well as MediCab transportation to and from the hotel and hospital on the day of surgery, 2-nights Marriott Hotel stay and appropriate taxes. Airport transfers, clinic transfers, meals, entertainment, special testing or additional rooms are not included. A-la-carte discounts are not available. Pricing is based on the amount of operative time, O.R. personnel, pre and post-operative care and difficulty required to achieve the desired results. The package for the "triple" is currently $7,000. The package for the minimally-invasive glottoplasty alone is currently $5,000.

What if I would like to come in just for a consultation?

A: Consultations are one hour and include voice analysis, physical examination, a scope of the voicebox and a lengthy discussion regarding expectations. The charge is $500, however, the fee will be applied towards the cost of a surgery package if you choose to proceed.

What if I am local and do not need the hotel or transportation?

A: The hospital will discount the transportation and accommodations from their portion of the package charges.

## General:

How many surgeries does the Center perform? Is the surgeon Board Certified? Fellowship trained?

A: The Center is dedicated to laryngeal (voicebox) surgery. Dr. Haben has performed hundreds of laryngoplastic surgeries and thousands of voice surgeries. The different techniques involved in feminization voice surgery have been developed and continue to be perfected at the Center over the last 10 years. Dr. Haben is Board Certified in Otolaryngology and Fellowship trained in laryngology and voice surgery, as well as earning a Master's Degree for his research in voice and laryngology. Dr. Haben routinely lectures and publishes research on voice surgery and related topics.

Why is a chaperone needed after the surgery? What if I do not have one?

A: It is mandatory hospital, State and Federal guidelines that any patient undergoing general anesthesia has a chaperone for the evening after surgery even though you have transportation to the hotel by Medicab. Any client without a chaperone is either required to spend the night in the hospital or the surgery will be cancelled. The hospital will charge an additional fee of $600 for overnight observation.

Do you accept Care Credit? How much is required to confirm a surgery date? What payments are accepted? What happens if I need to change the surgery date at the last minute? How far in advance do you book?

A: The practice does not accept Care Credit. Credit cards are the preferred method of payment. Personal checks are accepted, however, surgery can not be booked until the check clears, typically 10-20 business days depending on the origin of the check. Surgery may only be booked and confirmed once a 50% non-refundable deposit is made.

Changes are permitted without penalty, as long as the policy is not repetitively abused. Most non-peak surgery dates are available 4-6 weeks in advance.

Do you accept Medicare or private insurance for feminization? Do I get any forms that can be submitted to my insurance? Or to my accountant for taxes? Is there a procedure (CPT) code for the surgery?

A: Feminization laryngoplasty is an elective cosmetic procedure whether or not thyroid chondroplasty is performed. We do not accept Government or private insurance for the procedure, nor will submit any forms to the insurance. A receipt of payment is provided, however, we are not responsible for insurance reimbursement, tax rebates or credits. Receipts can *NOT* be altered, modified or amended under any circumstance to meet any requested criteria. The procedure (CPT) code used is 31599 whether the "minimally-invasive" or "triple" is performed.

I am coming internationally. Does this change anything?

A: International clients, except those from Ontario and Quebec, Canada, are required to stay an additional 7 days post-operatively before being cleared for international airtravel if having the "triple" procedure. Additional hotel days are arranged through the hospital at a discounted rate.

I need more days in the hotel or more total rooms. How is this arranged?

A: The package comes with a two night hotel stay, the night before and the night of the procedure. The hospital can arrange additional nights/ rooms at the hospital's pre-arranged discounted rates.

The "Doctor in South Korea" … … …?

A: Our Center gets dozens of inquires daily. Understandably, people are doing their research. Frequently, clients are asking how my technique does or does not differ from others; or why my patients are on one week of strict voice rest and theirs for one month; or why they do not offer CTA; etcetera. Unfortunately, I can not comment, or even know why another surgeon's technique, restrictions, or experience is different from my own. I can only attest to my own techniques, experience and voice outcomes. I recommend contacting the other clinics for an explanation as to why … ?

The "Doctor in South Korea" … … … on YouTube?

A: I have elected not to parade my very best results on YouTube or our website for ethical reasons. Patient privacy and confidentiality is of the upmost importance, and I do not believe that using patient videos or audios for medical advertising is appropriate. Ethical standards and customs in other countries may be different. Advertising with a "very best result" may give potential clients a false or unrealistic expectation for their own unique case. In the end, how *your* voice turns out is all that matters. I prefer posting *average results,* from which a potential client can make a sensible and informed decision, rather than an emotional one.

# Medical Questions:

Is there pre-operative testing required? I have heard that some surgeons require a CT scan before the Adam's Apple shave to prevent damage to the vocal cords.

A: In general no, unless you have a chronic medical condition, such as diabetes, or a history of heart problems, etcetera. Sometimes medical clearance from your Primary Care Physician is required. If you have a question or concern, contact our office before you make any arrangements. The hospital will make a pre-operative telephone call to you the week before the surgery and make any necessary testing or clearance recommendations. A CT scan is not required. A surgeon that requires a routine CT scan in every patient to better understand the anatomy of the voicebox well enough to avoid damaging the vocal cords probably should not be doing this sort of surgery. This is *not true* for *facial* feminization, where CT scans *are* generally recommended.

Do you perform the surgery on someone under 18? Older than 60?

A: Clients under 18 must have parental permission, be accompanied by a parent or legal guardian ***and*** have a letter of support from a qualified psychologist or psychiatrist. There is no "maximum age" however, the expectations for achieving a truly feminine sounding voice decreases with age due to reduced plasticity, hardening of the cartilages, stiffening of the vocal cords, and less optimal healing compared to younger individuals. This does not mean that very good results can not be achieved, just that they are harder to accomplish due to factors that are out of our control. Reasonable expectations will vary from client to client and can only be accurately determined at the time of consultation and examination with voice analysis.

I am/was a smoker. Does this matter?

A: Overall, former smokers heal worse and start off with much lower pitched voices than nonsmokers. Current or recent smokers fare much worse than former smokers. Of course, the amount and duration of smoking matters a lot. I do not test for recent or current smoking, relying on patients to tell the truth. Failure to disclose prior/ recent/ current smoking status inevitably results in suboptimal outcomes, frustration and disappointment. Former smoking does not prevent successful feminization. Current and/ or post-operative smoking (or *extensive* second-hand smoke exposure) can negatively impact success.

I have diabetes or another chronic medical condition. Does this matter?

A: All chronic medical conditions should be disclosed. Chronic medical conditions, especially diabetes, can negatively affect healing and ultimate outcomes. If these conditional have been and currently are very well controlled and clients are asymptomatic, the increased risks associated with the surgery, anesthesia, healing and negative outcomes are generally minimal. Your Primary Care Physician should be a good source of personal medical advice regarding your risks and candidacy for an elective surgery.

I have not yet gender reassignment surgery (GRS). How did this impact my voice? Is it better to have GRS first?

A: Male hormones have a masculinizing effect on the vocal cords and pitch. Estrogen, and to a lesser extent spironolactone, have a feminizing effect, but less so pre-GRS versus post-GRS. It is not necessary or specifically

recommended to have GRS prior to feminization voice surgery. The decision on which to have first is personal. Interestingly, many pre-GRS clients will have a further *improvement* in the voice a year or so after GRS because of the hormones.

## Operation and Technique:

I have had a prior Adam's Apple/ Tracheal Shave ("thyroid chondroplasty"), can you take off more? Does this complicate the feminization procedure?

A: A prior thyroid chondroplasty does make the CTA procedure a bit more complicated because of the scar tissue that develops in everyone. A prior successful thyroid chondroplasty will generally need to be revised if a CTA is done because the "Adam's Apple" is tipped forward as part of the CTA. I will revise the thyroid chondroplasty to be as cosmetic as possible; however, I am sometimes limited by the anatomy and previous scarring. Reasonable post-operative expectations are carefully explained during the pre-operative consultation. Approximately 20% of our clients have had a prior thyroid chondroplasty, so this is not an unusual situation.

Can you re-use a prior scar? Do you use a "plastic surgery" type closure?

A: In general, a prior scar can not be re-used because they are under the chin and too far away. Incisions are as small as reasonably possible without compromising the surgery; are hidden to the greatest extent possible in a skin crease; and are closed using plastic surgery technique.

I am a singer. How does this impact things?

A: Feminization does not give anyone a singing voice that did not exist before. Nor does it give additional upper range. Feminization raises the *speaking* pitch, without adding upper range. An external CTA *will reduce* overall range (on the bottom end). This occurs because the "singers muscles", the "crico-thyroid muscles, are permanently in a contracted position in a CTA. As such, singers, or those where range is very important, are recommended for the endoscopic glottoplasty alone.

How much can you raise the pitch?

A: The ***average*** is 8 semitones, or 2/3 of an octave or roughly 80 hertz for a combination of glottoplasty and CTA. Glottoplasty alone averages 7 semitones, or roughly 72 hertz of pitch elevation. The uppermost degree is limited by one's anatomy. Larger, stocky individuals tend to have less favorable anatomy than those more petite. Longer, thinner necks are easier to operate than shorter, thicker ones. The same is true for the glottoplasty. Thinner higher-pitched male voices are easier to operate than lower, thick, scarred, smokers, low pitched vocal cords.

I hear there is a risk for a chipped or broken tooth or teeth?

A: The endoscopic portion of the procedure is "trans-oral" (= through-the-mouth). Every precaution is taken with the teeth, however clients with smaller mouths, larger tongues, sleep apnea, limited neck extension, baseline poor

dentition, or extensive dental work are at an increased risk, which is roughly a 2-3% risk for intra-operative dental trauma.

How long is the surgery? How long am I in the hospital?

A: The endoscopic glottoplasty takes about an hour. The external CTA is an additional hour (without thyroid chondroplasty) or 1.5 hours (with thyroid chondroplasty) if performed. Clients arrive 1-1.5 hours before the surgery and leave 2-3 hours afterwards. Plan on 6 hours start to finish.

## Post-operative:

For endoscopic glottoplasty alone, is the post-operative recovery different?

A: There is less post operative discomfort, lifting / showering restrictions, and "downtime" when there is no neck incision. The voice rest, overall recovery and duration until final voice outcome is achieved remains the same.

How long until the procedure is permanent? When can I have other surgery?

A: Both the CTA *fusion*, as well as the glottoplasty *web*, are complete at 3 months. I do not recommend elective surgery before 3 months after feminization voice surgery.

I have changed my mind and want my old voice back, can the procedure be reversed?

A: No. Just so that I am clear: no.

I see from the post-operative instructions on this page that there is one week of absolute voice rest. What happens if I cough? Talk in my sleep? Slip up? Get a cold? Whisper?

A: I ask clients to control what they have control over. Do not worry about slip ups, talking in your sleep, or getting sick. You have no control over these. As for coughing, this can be very damaging to the vocal cords while they are healing. As such, every patient goes home on a codeine-based cough suppressant for both pain control *and* cough suppression. Whispering is forbidden for the first *month*. It is more traumatic than talking.

I use my voice a lot for my work. When can I resume my normal voice usage without harming my voice?

A: Although there is only 1 week of strict voice rest, the final result takes 2-3 months before everything heals and the voice settles down. Once voice use is allowed on post-operative day 8 the voice will sound *MUCH WORSE* before it gets better. This is due to 'surgical laryngitis.' It *WILL* heal, but clients must be patient. Most can return to work on Monday, post-operative day 19, 2½ weeks after the surgery. *Overusing* the voice at this point will not cause permanent damage. It will simply delay healing and the final result. *Abusing* the voice, by contrast, at this or any point after the surgery could irreversibly damage the voice, (as would smoking).

Is there much post-operative pain?

A: Although I give codeine-based liquid pain and cough medication post-operatively, most people state that the pain is tolerable and actually controlled well-enough with ibuprofen. Having a little more or a little less pain is not a sign of "something wrong", unless the pain is increasing day after day, which may indicate an infection. Patients having an incision will be placed on antibiotics. All patients are placed on steroids.

Can I use anti-scar cream or patches? What about the stitch removal? Any other advice for the incision/scar?

A: The neck incision is as small as possible, hidden in a skin crease and closed with plastic surgery technique. All but one suture is absorbable. The one (blue) stitch on the outside is removed on the seventh post-operative day, by myself whenever possible, or by a medical person in your community for those who can not stay in town. If your local medical professional has any questions regarding removal of the stitch, they are encouraged to call the office. Clients may not remove their own suture. Once the suture is removed, you may start to shower. Pat, do not rub, the incision dry after showering for the first month. If going out doors, use a >30 SPF sunscreen, or cover the incision with a scarf. Antiscar creams/ patches, Vitamin E oils, etcetera, may be used after the first month. Scars typically take 6-12 months to mature and heal. *6-12 months*. Be patient.

It is somewhat effortful to produce voice for the first few months even though it sounds great. Why?

A: Your larynx, your instrument" has been *tuned up* to a much higher frequency. As such, you will now have to learn to "play" a flute, when you were used to playing a saxophone. The effortful feeling goes away after 3-12 months. It occurs less if CTA is not performed.

The Adam's Apple shave looks good, but now there is somewhat of a prominence lower down?

A: The CTA raises pitch by bringing together the two cartilages, the cricoid and thyroid, which stretch the vocal cords. This is how a singer gets into the falsetto voice. Unfortunately, both are brought together and tilt forward with a CTA, but only the thyroid notch ("Adam's Apple") can be shaved. "Tracheal Shave" is an unfortunate misnomer as NO PART of the trachea (OR cricoid) is or could be shaved or reduced.

How many times am I seen post-operatively? Can I get voice analysis of the final product?

A: All clients are seen the day after surgery and cleared for travel. International clients are seen on the first and seventh post-operative days before being cleared for travel. All clients are recommended to return at 3 months for an examination and voice analysis. All post-operative care is included in the package. For those who can not make it back at 3 months, I recommend recording the "Rainbow Passage" (provided in the post-operative instructions) on a smartphone and e-mailing it for analysis and a reply comparing pre and post-operative vocal parameters.