

## Chapter 1

# THE CONSULT, PREOPERATIVE PERIOD, INSTRUMENTATION AND ANESTHESIA SETUP, AND POSTOPERATIVE PERIOD

by

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### THE CONSULT

Any successful hair transplant begins with a patient's first interaction with the physician's office. Whether via phone or e-mail, a well-informed, timely response to a patient's question is the first step in establishing a good doctor–patient relationship. If a patient requests information before the consult, he or she should be directed to a website or published literature that reflects the philosophy of the office.

The consult establishes candidate selection and realistic expectations. All patients should expect natural undetectable transplanted hair. No patient should EVER have a straight “pluggy” hairline. This is because over the last decade, physicians have transitioned from larger ten to twenty hair grafts to natural one- to four-hair follicular groupings. With the appropriate technique, *all* patients will have natural-appearing transplanted hair. Therefore, in the early twenty-first century, the key to success is to establish realistic expectations regarding the *perceived density*

from a hair transplant. To establish this, a hair loss history must be obtained by the physician during the consult. This includes how long the hair loss has been going on, the rate of hair loss, treatments to date, and physical characteristics of the hair, including the caliber, wave, and donor density (Table 1.1). The net density from a procedure is equal to the total number of hair follicles transplanted minus the ongoing loss of existing hair. It will be more difficult to create the perception of a net increase for patients with rapidly ongoing hair loss than for patients whose hair loss has slowed, either naturally or from medications. Patients who have an equal number of thick, wavy hair follicles versus fine, straight follicles will have equal growth of transplanted hair but a very different perception of density. Those with thicker caliber follicles may appear to have 50–100% more hair than those with thin, straight hair (Table 1.2).

Another important issue to discuss is where to transplant hair and how many procedures will be

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TABLE 1.1. The Consult

| Physical Exam                       | Questions  |
|-------------------------------------|--|
| Caliber of hair: coarse vs. fine    | How long have you been losing your hair?           |
| Donor density: hair/cm <sup>2</sup> | What have you done to try to treat the hair loss?  |
| Wavy vs. straight                   | What about your hair loss bothers you?             |
|                                     | Medical history                                    |
|                                     | What are your expectations from a hair transplant? |

needed over time to achieve the patient’s goals. The physician should ask whether the patient’s chief cosmetic concern is the frontal scalp, the vertex, or both. It is important to review the ongoing nature of hair loss in men and the natural recession of temporal and posterior hairlines in the vertex. Transplanted hair must appear natural one year – and twenty years – after the procedure. The frontal two-thirds of the scalp is a long-term, cosmetically “safe” region for transplant. The vertex of the scalp has more long-term cosmetic risk for male patients. The ongoing nature of hair loss can create an unnatural “doughnut” of bald skin surrounding transplanted hair. The number of surgeries needed will reflect the rate and extent of future hair loss. The majority of patients can achieve their cosmetic goals with two procedures.

All patients should have a comprehensive medical history taken and documented. Any active medical conditions or medications that may interfere with a safe transplant procedure should be discussed with other specialists or the primary physician treating the patient. When necessary, medical clearance should be obtained prior to the procedure.

TABLE 1.2. Key Concepts

|   |
|---|
| <ul style="list-style-type: none"><li>• Ongoing hair loss affects the density and cosmetic appearance of the procedure<ul style="list-style-type: none"><li>○ Net density = HT – ongoing hair loss</li></ul></li><li>• Caliber of hair follicles will help determine the perceived density of the procedure. An equal number of thick and thin hair follicles will not create the same perceived density</li><li>• Donor density</li><li>• Visible scar if the donor region is shaved</li><li>• Limited donor</li></ul> |
|---|

TABLE 1.3. Preoperative Course

|  |
|--|
| <ul style="list-style-type: none"><li>• No specific preoperative bloodwork is required</li><li>• Review consent form and written pre/postsurgery instructions at least 24 hours before surgery. All questions should be answered before surgery</li><li>• All women in child-bearing years, check B-HCG</li><li>• Prophylactic antibiotic as indicated</li><li>• Avoid aspirin or alcohol for at least one week prior to surgery</li><li>• If needed, medical clearance from primary physician</li></ul> |
|--|

Patients should be encouraged to contact the office with any questions they have before undergoing the procedure. Once scheduled, all patients are sent a packet containing detailed preoperative instructions and a detailed consent form (Table 1.3). We encourage all patients to contact us with any questions or concerns they have before the procedure.

THE DAY OF THE PROCEDURE

On the day of the procedure, we encourage all patients to have breakfast before coming into our office. The patient is brought into a room, the preoperative and postoperative instructions are reviewed, and any questions are answered. The consent form is reviewed and signed. The physician comes into the room and answers any questions. The physician reviews the procedure once again, detailing where the hair will be transplanted. Patients are encouraged to let the physician or anyone on the staff know if

TABLE 1.4. Postoperative Course

|   |
|---|
| <ul style="list-style-type: none"><li>• Resume normal activities immediately, but avoid heavy exercise for 1 week</li><li>• Overnight dressing removed on post-op day 1</li><li>• Prednisone 40 mg once daily for 3-5 days, given to help reduce frontal edema from local anesthesia</li><li>• Tylenol #3 1–2 tabs every 4–6 hours as needed for pain; if needed beyond first night, then call doctor</li><li>• The recipient and donor sites are cleaned with diluted hydrogen peroxide solution for 1 day postop only</li><li>• Advised to shower on day 1 but do not pick/scratch at hemorrhagic perifollicular scabbing</li><li>• Emollient applied to recipient sites for 1 day and donor region 1 week</li><li>• Majority of patients return to work 2–3 days postop and feel cosmetically comfortable</li><li>• Staples removed 7–10 days after surgery</li><li>• First follow-up 6 months after surgery</li><li>• Final density 12 months after surgery</li></ul> |
|---|

TABLE 1.5. Items to Be Autoclaved Together

|  |
|--|
| Steri-wrap autoclavable sheets ×5  |
| Steel instrument container   |
| Multi-blade handle   |
| 2.0-mm spacer ×4   |
| 1.5-mm spacer ×1   |
| 1.0-mm spacer ×1   |
| 0.5-mm spacer ×1   |
| Scalpel handle   |
| Multi-tooth forceps (for grasping donor ellipse during harvest)                      |
| Scissors (optional, for undermining donor region)                                    |
| Hemostat (in event of bleeding)  |
| Staple remover   |
| Follicular forceps ×6 (curved or straight, designed for cutting and planting grafts) |
| Skin hooks ×2  |
| Steel comb   |
| Tongue depressor ×5  |
| Petri dish ×3  |
| 3 × 3 gauze (full pack)  |
| Cotton tip applicator ×100   |

they need to go to the bathroom during the procedure, want something to drink or eat, or need more anesthesia.

Patients are brought to a changing room where they can leave their belongings and put on a gown. They are then escorted into the procedure room. Here, the staff is introduced and the donor region is marked and trimmed. The procedure is about to begin!

After the procedure is completed, a dressing is applied that should be kept on overnight. The dressing, which is nonadherent to any part of the scalp, is to protect the grafts while they heal. It consists of Telfa



FIG. 1.1. Central work area.



FIG. 1.2. Sterile, blue sheets are used to cover two Mayo stands placed on either side of the operating table.

pads with ointment applied over the scalp and donor region held in place with gauze and a Kerlix. A cap is placed over the dressing for cosmetic camouflage. The dressing is left in place overnight and removed the next day. The patient is instructed to call the office with any questions or concerns (Table 1.4).

INSTRUMENT AND ANESTHESIA SETUP

The day of the procedure can proceed smoothly with proper preparation and setup. The hair transplant



FIG. 1.3. On one Mayo stand, we place the forceps, multi-blade scalpel with appropriate spacers, single-blade scalpel, multi-tooth forceps, scissors, hemostat, staple remover, skin hooks (from packet), and a disposable sterile stapler.



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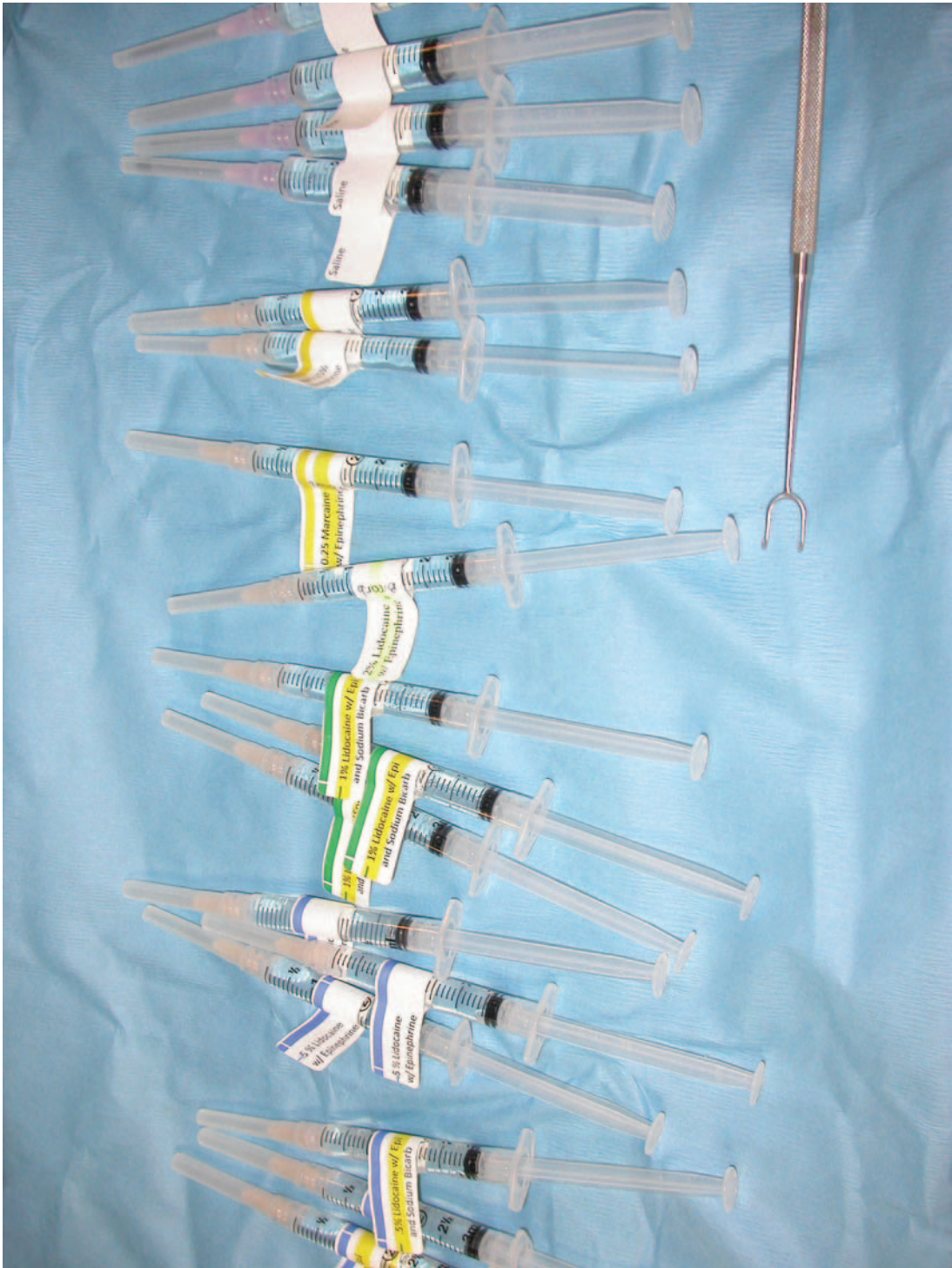


FIG. 1.4. On the other Mayo stand, we place the local anesthesia syringes.

TABLE 1.6. Anesthesia for Donor and Recipient Sites

| Anesthesia   | Number of Syringes |
|--|--------------------|
| Lidocaine HCl 0.5% with epinephrine 1:200,000                    | 3 @ 3 cc each      |
| Lidocaine HCl 0.5% with epinephrine 1:200,000 with sodium bicarb | 3 @ 3 cc each      |
| Lidocaine HCl 1.0% with epinephrine 1:100,000 with sodium bicarb | 2 @ 3 cc each      |
| Lidocaine HCl 1.0% with epinephrine 1:100,000                    | 1 @ 3 cc           |
| Saline   | 4 @ 5 cc each      |
| Lidocaine HCl 2.0% with epinephrine 1:100,000 with sodium bicarb | 1 @ 3 cc           |
| Marcaine 0.25% with epinephrine 1:200,000                        | 3 @ 3 cc           |

team should prepare for the surgery by creating a number of packets that are organized, sterilized, and ready for surgery. We outline what instruments are needed and how best to place them in the operating suite. Of course, everyone develops his or her own way, but we have found success with this arrangement. Table 1.5 lists items that can be autoclaved together and then set up in the central work area (Figure 1.1).

Sterile, blue sheets are used to cover two Mayo stands placed on either side of the operating table (Figure 1.2). On one Mayo stand, we place the forceps, multi-blade with appropriate spacers, scalpel,



FIG. 1.5. The follicular forceps, petri dishes, tongue depressors, and five razor blades are placed on a half-sheet of Steri-wrap and used by the technicians to cut the grafts.



FIG. 1.6. A comb, paper tape, and hairclips are kept ready for marking the donor area surgical site.

multi-tooth forceps, scissors, hemostat, staple remover, skin hooks (from the packet), and a disposable sterile stapler (Figure 1.3). We then add whatever needle will be used to create recipient sites.

On the other Mayo stand, we place the local anesthesia syringes (Figure 1.4). Again, the syringes are drawn up in advance and labeled appropriately (Table 1.6). All syringes containing anesthesia are 3 cc in size. This is to reduce the hydrostatic pressure needed to inject intradermally, which is more difficult than injecting in the subcutis. Saline is also drawn up, but in larger, 5-cc syringes. Saline is



FIG. 1.7. We trim the hair to a length of 2–3 mm.

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injected directly into the subcutis of the donor area for hemostasis, anesthesia, and to create turgor to help straighten the follicles. Table 1.2 provides a description of the different types of anesthesia used.

The follicular forceps, petri dishes, tongue depressors, and five razor blades are placed on a half-sheet of Steri-wrap and used by the technicians to cut the grafts (Figure 1.5). Tongue depressors are folded lengthwise and used as cutting boards, with the convex side up. Multiple razor blades are placed at each cutting station because they can dull quickly depending on the tissue. Patients with a history of previous transplantation, resulting in scar tissue, can have tissue that is especially difficult to divide.

Before the patient enters the room, the operating table is draped with a clean paper. We provide an ergonomic headrest for the patient to lie in a prone position during the harvest process. A comb, paper tape, and hairclips are ready for marking the donor

TABLE 1.7. Miscellaneous Equipment

| Item  | Purpose  |
|---|--|
| Spray bottle with 75% saline, 25% H <sub>2</sub> O <sub>2</sub> | To keep scalp clean and moist while planting grafts    |
| Antibiotic ointment   | To spread on Telfa pads                                |
| Telfa pads  | To cover the donor and recipient sites postoperatively |
| Kerlix gauze  | To wrap the scalp postoperatively                      |
| Bandana or cap  | To cover the bandages postoperatively                  |

area surgical site (Figure 1.6). A ruler is available to measure the planned donor area, as well as an electric razor to gently trim it prior to excision. As shown in Figure 1.7, we trim the hair to a length of 2–3 mm.

Other miscellaneous items needed for the procedure are listed in Table 1.7.

Many of the instruments mentioned in this chapter are available on the internet or through suppliers, such as A to Z Surgical/George Tiemann Instruments and Ellis Instruments.



## Chapter 2

# MEDICATIONS AND HAIR TRANSPLANTATION

by

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### INTRODUCTION

Patients with hair loss will often present to a hair transplant surgeon for a consultation. As a result, hair transplant surgeons must be aware of both surgical and medical options to treat male and female pattern hair loss. Their knowledge must include not only an understanding of medical causes for hair loss but also medical management options. The ideal medical or surgical solution for the treatment of hair loss would be simple to use, without side effects and complications, and would be universally effective and affordable. To date, such an agent has not been discovered. It is because of these shortcomings that medical agents are frequently used in combination with one another and as adjuvant therapy to surgical hair restoration. As the commonly available and promoted treatments for hair restoration are intended for the management of pattern hair loss or androgenic alopecia, the prescribing physician must be able to recognize all other forms of alopecia as well.

### CURRENTLY AVAILABLE AGENTS

#### Minoxidil

The most commonly utilized topical therapy is minoxidil. This medicine was originally developed as an

oral antihypertensive agent. When given for treatment of refractory hypertension in renal transplant patients, it was found to cause a secondary hypertrichosis. Soon, studies demonstrated that the topical version of this agent resulted in increased hair counts. A 2% minoxidil solution received FDA approval in 1988 for male pattern hair loss. Later, the FDA approved both a 2% and a 5% solution formulation for over-the-counter distribution. A 5% minoxidil foam vehicle delivery system was recently introduced. The foam product is easier to use than the solution, which appears to increase compliance. Figure 2.1 illustrates the Rogaine Foam (McNeil-PPC, Inc. Morris Plains, NJ) product.

Topical minoxidil is effective in both male and female pattern hair loss. The exact mechanism of action in promoting hair growth is unknown. Studies have demonstrated the superiority of minoxidil over other vehicles in both men and women. The treated patients experienced increases in both number and weight of their hair. The 5% formulation has also been shown to be superior to the 2% formulation in men. In a randomized trial of 5% and 2% minoxidil in females, the patients perceived a greater benefit from the 5% formulation. However, the investigators did not detect a significant difference between the

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**FIG. 2.1. Rogaine foam. This form of topical minoxidil is easier to use than solution and may increase compliance.**

two formulations. Additionally, the 5% formulation resulted in a greater incidence of side effects, including unwanted hypertrichosis in women.

In addition to its role in the medical management of pattern hair loss, minoxidil serves as a useful adjunct therapy in the surgery patient. Small studies, as well as observations from experienced hair restoration surgeons, have led to the use of minoxidil in the preoperative and postoperative phases. It can help decrease post-transplant effluvium and hasten the growth of transplanted hair follicles.

Strategies for optimizing minoxidil use:

1. Men should use the 5% solution once daily. Although the product insert recommends twice-

daily application, simple daily application, in addition to using the foam, can dramatically enhance compliance.

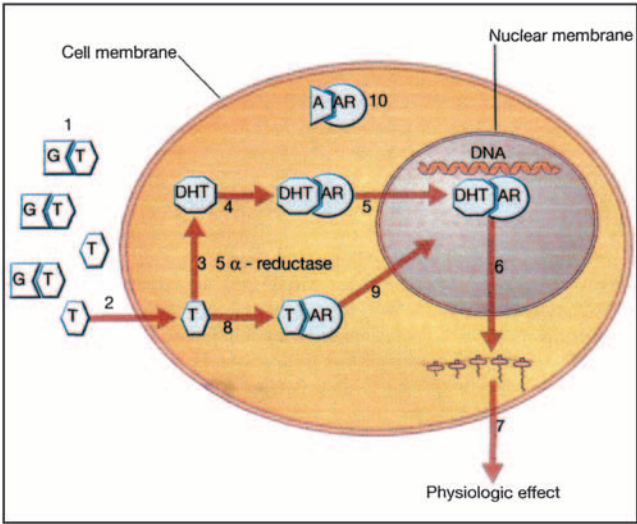
2. Women should begin with the 2% formulation. If they are not satisfied with the response, they can step up to the 5% formulation. Although the 5% solution is not approved for use in women, this off-label usage is commonly recommended by many hair transplant surgeons. As above, use of the foam may increase compliance because it is easier to apply than the solution. It may also result in less hypertrichosis because it is less messy and does not drip down the sides of the face and neck.
3. Despite the product label indicating that minoxidil is for the vertex only, it may be applied to all thinning areas.
4. Apply the solution directly to the scalp with a dropper. The foam should be gently rubbed into the scalp using one's fingertips. Be sure to wash hands afterward.
5. Some patients have reported scalp irritation after using the solution. This can result from propylene glycol in the solution. If severe, the patient should discontinue or switch to the foam, which does not contain propylene glycol.
6. Best results are seen when used perioperatively in surgery patients.

### Antiandrogens

It is widely accepted that androgens play a pivotal role in mediating male pattern hair loss. The contribution of androgen excess in causing female pattern hair loss is speculated but less certain. A number of oral antiandrogens have been proposed for the management of pattern hair loss. Figure 2.2 illustrates the key androgen pathways involved in androgenic alopecia.

In the male patient, dihydrotestosterone (DHT) plays a key role in pattern hair loss. Circulating testosterone, derived from the testes and the adrenal gland, enters the intracellular space and exerts a





**FIG. 2.2. Key androgen pathway:** 1. Testosterone (T) bound to circulating binding globulins (G). 2. T enters target cell. 3. Conversion of T to dihydrotestosterone (DHT) by 5 $\alpha$  reductase. 4. DHT binds to cytosol androgen receptor (AR). 5. DHT-AR complex enters cell nucleus. 6. DHT-AR complex binds to DNA, producing cell-specific mRNA. 7. Protein synthesis produces physiologic effect. 8. Direct binding of T to alternate cytosol AR. 9. T-AR complex enters cell nucleus. 10. Antiandrogen (A) binds to cytosol AR.



**FIG. 2.3. Oral agents for male pattern hair loss – left to right:** Propecia (1 mg finasteride, Merck & Co., Inc. Whitehouse Station, NJ), Proscar (5 mg finasteride, Merck & Co., Inc. Whitehouse Station, NJ), Finasteride 5 mg (generic), and Avodart (0.5 mg dutasteride, GlaxoSmithKline).

physiologic effect. Five-alpha reductase is the enzyme responsible for the conversion of testosterone to DHT. The net result is that DHT leads to progressive hair miniaturization. In the female patient, the path-

ways and activities of androgens in hair loss are not fully elucidated. Some women with pattern hair loss benefit from antiandrogen therapy, suggesting androgens play a role in this condition.

Figure 2.3 depicts currently utilized oral agents: finasteride in three forms and dutasteride.

**Finasteride**

Finasteride competitively inhibits type II 5 $\alpha$  reductase. This enzyme has two isotypes: type I is constitutively expressed throughout the body, while type II is isolated to the scalp hair follicles, prostate, and liver. Finasteride was first approved in a 5 mg dosage, as Proscar<sup>®</sup>, for the management of benign prostatic hypertrophy. Later, a 1 mg dose was introduced for the treatment of male pattern hair loss. Large clinical trials have confirmed the beneficial effects of finasteride in reversing or arresting the progression of male pattern hair loss. In the postpubertal male, DHT exerts no necessary physiologic effect; thus, its inhibition is possible without significant side effects. The chief adverse effects of the oral administration of finasteride are a decreased libido and erectile dysfunction.

Finasteride is available in 1-mg tablets as the branded drug Propecia<sup>®</sup> (Merck). The manufacturer offers a ninety-day supply under the branded name Propecia<sup>®</sup> ProPak<sup>®</sup>. Finasteride 5-mg tablets were introduced as the branded drug Proscar<sup>®</sup> (Merck). Finasteride 5 mg is no longer patent protected and is available as a generic medication. As a cost-saving measure, some patients have utilized 5 mg generic finasteride and quartered the pills to deliver a daily dose of approximately 1.25 mg (Figures 2.4 and 2.5).

The enzyme 5 $\alpha$  reductase is critical for male fetal development. Females of childbearing potential should never ingest this drug. They also should also not handle broken or crushed tablets.

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**FIG. 2.4.** Generic finasteride 5 mg quartered. Note that females of childbearing potential should avoid handling or using broken or crushed pills.

The utility of finasteride in female pattern hair loss is less certain. Although it should not be used in women of childbearing age, it has been tested in postmenopausal women. A multicenter trial of postmenopausal females with pattern hair loss failed to show benefit from finasteride 1 mg. Smaller studies utilizing higher doses of finasteride (2.5 or 5 mg) in normoandrogenic females have shown some benefit. Other small studies have shown some benefit of finasteride in hyperandrogenic females with pattern hair loss. When weighted, the best conclusion regarding the utility of finasteride in female pattern hair loss is one of uncertainty.

Strategies for optimizing the use of finasteride:

1. Start medication at the earliest sign of hair loss.
2. Women of childbearing potential should not use or handle crushed or broken tablets.
3. The medication must be continued indefinitely and should not be discontinued if the patient undergoes hair restoration surgery.
4. Efficacy in postmenopausal women is uncertain.

### Dutasteride

Dutasteride inhibits both type I and type II  $5\alpha$  reductase. Dutasteride 0.5 mg, branded as Avodart<sup>®</sup>



**FIG. 2.5.** Inexpensive, simple to use commercially available pill splitter used to section 5 mg finasteride in Figure 2.4.

(Glaxo Smith Kline), is indicated for the treatment of benign prostatic hypertrophy. The use of this medication in treating hair loss is considered off label. Dutasteride is a more potent inhibitor of  $5\alpha$  reductase than is finasteride. As both isoenzymes are present in the human scalp, it is theorized that dual inhibition may provide an enhanced response in pattern hair loss compared with inhibition of type II  $5\alpha$  reductase alone. A controlled trial comparing dutasteride and finasteride demonstrated a faster onset of the dual  $5\alpha$  reductase inhibition over inhibition of type II isoenzyme alone in the treatment of male pattern hair loss. A placebo-controlled study of identical twin males demonstrated that dutasteride was effective in treating pattern hair loss. Similar to finasteride, the most common side effect was