Definition

- Postpartum or puerperium is defined as the period of time from the delivery of the placenta and membranes to the return of the women's reproductive tract to its nonpregnant (not pre-pregnant) condition
- It lasts approximately 6 weeks

Time Frames of Postpartum

- The immediate postpartum: The first 24 hours after birth
- The early postpartum: The first week after birth
- The late(Remote) postpartum: The second to sixth week

Reproductive Organs

- Uterus
- Endometrium
- Lochia
- Cervix
- Vagina and Perineum

Uterus

- Involution of the Uterus is the process of regressive change of uterus from the altered state of pregnancy to a state that closely resembles prepregnancy
- Involution involves reorganization and shedding of the decidua/endometrium and the exfoliation of the placental site

L'INVOLUZIONE UTERINA

- L'immediata involuzione uterina è causata dall'espulsione del feto, del liquido amniotico e della placenta
- L'ulteriore involuzione è data dall'autolisi delle proteine miometriali intracellulari, che determina una riduzione del volume cellulare ma non del numero di cellule.

Uterine weight

- 1000-1100 gms: after delivery
- 500-700 gms (one Lbs) :1 week postpartum
- 300-500 gms (11-12 oz): 2 weeks p.p.
- 50-70 gms (2 oz): 6 weeks p.p.

Endometrial Regeneration

- Decidua after seperation and expulsion of the placenta consist of 3 layers

- Zona Compacta(Superficial layer)
- Zona Spongiosa(Middle layer)
- Zona Basalis(Basal layer)

Regeneration of the Endometrium

- Occurs by 2-3 weeks
- Healing at the placental site--over 6-7 weeks
  - 9 cm after delivery
  - 41/2 cm by 8th p.p. day
  - 2 cm by 8 weeks p.p.

CNM Implications for Care

- There should be a gradual decrease in fundal ht & size
- When assessing involution, consider:parity, wt. of baby, method of delivery, breastfeeding, bladder fullness
- If involution not appropriate, consider retained clots, placental fragments, uterine Fibroid, infection
- Anticipatory guidance

Lochia

- Uterine discharge that escapes vaginally during the puerperium
- Three forms of lochia
  - Rubra(2-4 days):red, blood from placental site
  - Serosa(‘till day7-10):Pinkish brown, wound exudate, some blood, cervical mucus
  - Alba(3-6 weeks):whitish yellow, primarily leukocytes, decidual cells mucus

FISIOLOGIA DEL PUERPERIO: I LOCHI

- L'essudazione, che accompagna i processi riparativi e l'eliminazione dall'utero dei residui dei tessuti gravidici, prende il nome di lochiazione e le perdite genitali sono denominate lochi
- Nei primi 3 giorni dopo il parto, la decidua rimasta in utero si differenzia in uno strato superficiale che va in necrosi e viene espulso, ed uno strato basale contenente gli sfondati ghiandolari da cui si rigenera l'endometrio
- I lochi possono persistere diverse settimane

Lochia

- Average total amount of lochia-240-270 ml
- Measure of lochia (1 Pad/hr.)
  - scant: 2.5 cm(1”)
  - minimal: 4 cm
  - moderate: 6 cm
  - heavy: 15 cm

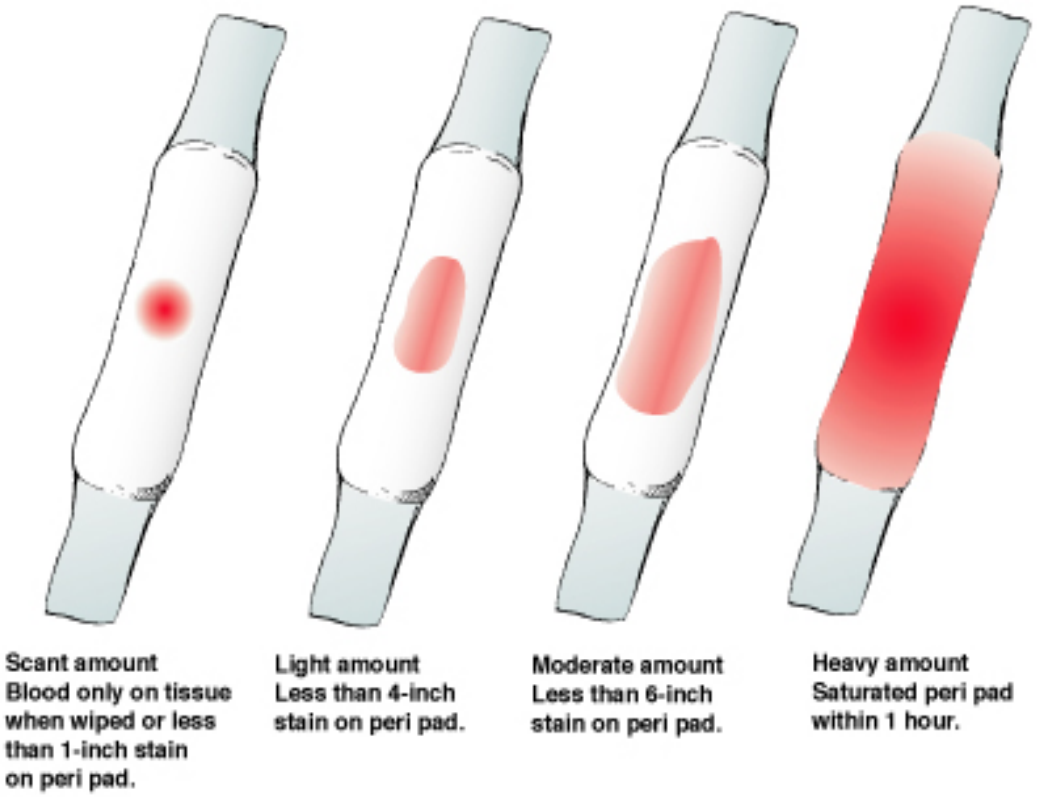


Figure 3-7 Variations in lochia.

CNM Implication for Care

- Pt. education regarding normal findings
- Consider sub-involution of the placental site if prolonged lochia rubra or gives history of episodic brisk, painless vaginal bleeding
- Prolonged lochia rubra=at risk for delayed p.p. anemia

Cervix

- Immediate p.p.:thin, bruised, edematous,& it hangs into the vagina
- 1-2 days: admits 2 fingers
- 1 week: one finger
- 10-12 days:one finger barely into internal os
- 4 weeks: external os is a small transverse slit

Vagina and Perineum

- Return of the vaginal Rugae-3-4 weeks
- Mucosa atrophy- resolves by 6-10 weeks
- Returns to nonpregnant appearance 6-8 weeks for non-lactating women, with ovulation for lactating women
- Hymen-Myritiform caruncles
- Abraisions &lacerations-heals readily

Pelvic Muscle/Ligaments

- Facial relaxation occurs after delivery
- Broad & round ligaments-constrict to nonpregnant state by 6 weeks p.p.
- Abdominal wall-rupture of elastic fibers in the skin
  - Stria gravidarum
  - Diastasis of the rectus muscle
  - Linea negra

CNM Implications for Care

- Potential dyspareunia due to atrophy
- Kegel's exercise to increase pelvic muscle tone
- Avoid strenuous exercise
- Potential source for infection
- Abdominal toning exercise

FISIOLOGIA DEL PUERPERIO: APPARATO CARDIO-VASCOLARE

- Ritorno allo stato pre-gravidico 2-3 settimane dopo il parto
- Immediatamente dopo il parto il volume plasmatico si riduce di circa 1000ml a causa delle perdite ematiche
- Nell'immediato postpartum vi è un rientro dei liquidi extracellulari nello spazio intravascolare
- L'aumentata funzione cardiaca persiste per qualche ora dopo il parto, mentre l'elevata frequenza cardiaca persiste per 1 ora dopo il parto
- Questi fattori contribuiscono all'insorgenza di scompenso cardiaco durante il postpartum nelle pazienti cardiopatiche

Cardiovascular

- Blood volume, cardiac output changes: returns to normal nonpregnant value by 2 weeks
- Blood coagulation factor-persist for variable periods, reach nonpregnant state by 6 weeks
- Hgb/Hct-depend on blood loss
- RBC-4-6 weeks
- WBC-up to 20-25,000/mm3 first 10-12 days, returns to normal by 6 weeks

Vital Signs

- BP-remains stable immediate p.p.,to baseline within 1 week
- Temp-return to normal within 24 hrs
- Pulse rate-should be within normal unless affected by a prolonged labor and excessive blood loss

CNM Implications for Care

- Close observation of pt. with history of cardiac disease
- Significant blood loss-check orthostatic vital signs
- Pt. with persistent elevated temp. after intervention-evaluate for infection
- Aware hypercoagulation state of p.p.

Gastrointestinal System

- GI motility & tone -normal peristalsis and bowel function returns within 2-3 days
  - factors that may impact on elemination
- Liver function- returns to normal in 10-14 days. Liver enzyme & lipids to non-pregnant value in app. 6 weeks
- Basal metabolic rate returns to normal app. 1-2 weeks

CNM Implications for Care

- Encourage PO hydration
- High fiber diet
- Order stool softener or laxative
- Decrease patient's anxiety

Renal System

- Renal pelvis and ureters- stretched & dilated during pregnancy, returns to normal by the end of 4th week
- Bladder tone & adequate emptying-in 1-7 days
- Immediate p.p.-bladder is edematous, congested & hypotonic

FISIOLOGIA DEL PUERPERIO: APPARATO URINARIO

- La funzione renale permane elevata per qualche settimana
- Il parto vaginale può provocare un edema periuretrale, che causa una ritenzione urinaria transitoria

Renal system

- Renal blood flow & GFR returns to normal in 4-6 weeks
- Glucosuria due to impaired tubular reabsorption-resolves on the 1st week
- Diuresis-starts shortly after delivery and lasting up to 5th day p.p.(up to 3000 ml/ day)

CNM Implications for Care

- Frequent bladder assessment
- Encourage bladder emptying
- Patient education-diuresis, po fluid, perspiration

Integumentary System

- Pigmentation-chloasma, linea negra, hyperpigmentation of areola
- Vascular changes-Spider angioma, palmar erythema
- Mucus membrane-nasal edema, bleeding gum, epistaxis resolves with decrease of estrogen

Integumentary System

- Striae gravidarum-result from increased corticosteroid level and stretching & rupture of the elastic fibers of the skin
- Hair loss-2-4 month, there is a marked increase in hair loss(app. 30%)-will regrow in 6-12 months

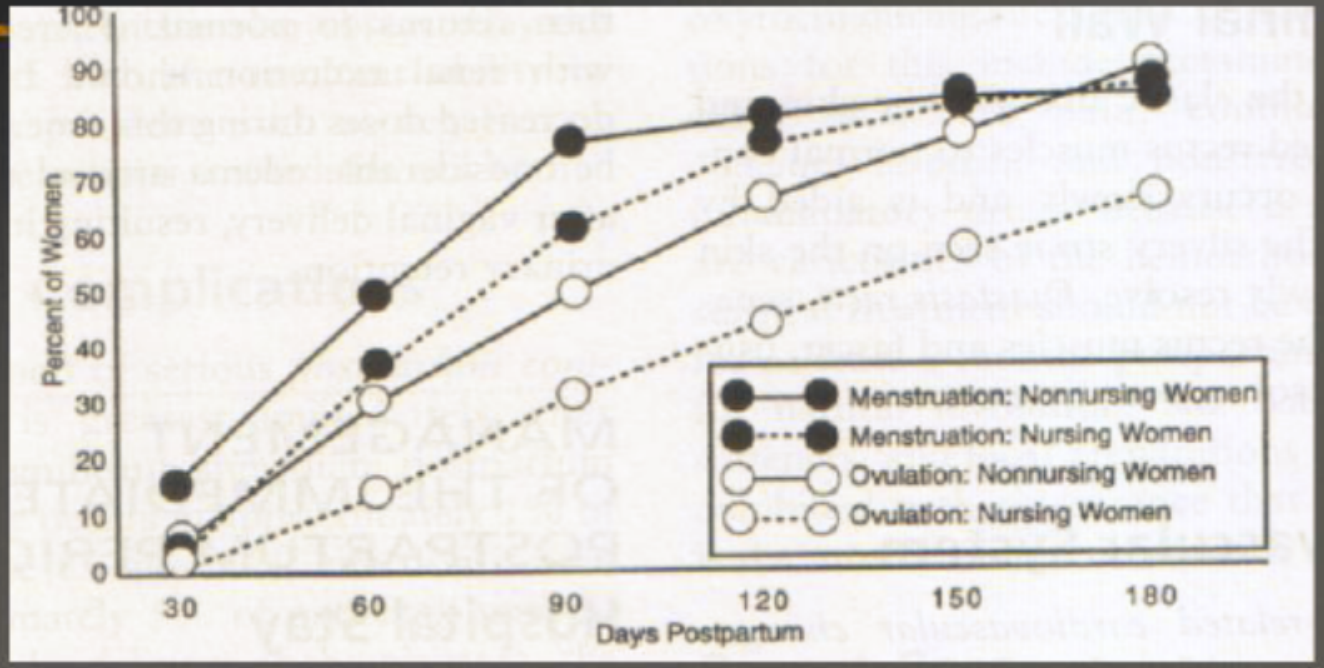
CNM Implications for Care

- Patient education and anticipatory guidance, especially during antepartum period

Endocrine Changes

- Occurs due to removal of the placenta with its hormones and to changes in prolactin secretion
- The rate at which placental hormones disappear from the maternal system depends on the half life of the substance in maternal plasma

FISIOLOGIA DEL PUERPERIO:
FUNZIONE OVARICA



Comparsa dell'ovulazione e delle mestruazioni nel postpartum

Placental Hormones

- Estrogen: rapid fall after delivery with lowest level by day 7, then gradually increase to follicular phase over few weeks
- Progesterone: slower than estrogen because corpus luteum continues progesterone secretion 1st few days after delivery.
- Withdrawal of estrogen & progesterone stimulate production of prolactin. Production of estrogen/progesterone with 1st ovulation cycle

Pituitary Hormones

- FSH & LH: very low day 1-10 p.p. Level increase gradually with resumption of pituitary function in 4-6 weeks
- Prolactin:essential for milk production. Serum level high during pregnancy. But suppressed by prolactin inhibiting factor
  - lactating women: normal value in 6 mo
  - non-lactating: preprgnant level in 2 weeks

Pituitary Hormones

- Oxytocin: Stored & secreted by the post. Piyuitary gland
- Oxytocin stimulates electrical and contractile activity in the myometrium
- Oxytocin acts on the myoepithelial cells surrounding the alveoli and duct(let down)
- Baby suckling creates sensory stimulus which activates the release of oxytocin
- Psychoemotional factor can promote or inhibit this process

Pituitary Hormones

- Thyroid hormone:Thyroxine and other thyroid function are highest at delivery. Decrease in value on 3-4 p.p. day.
- Thyroid size normal over 12 week period
- Women are at risk of developing autoimmune thyroiditis in the p.p. period

Return of the Menses & Ovulation

- Non-lactating women:
  - 40% resumes menses by 6 weeks
  - 65% by 12 weeks
  - 90% by 24 weeks
- Lactating women:80% of 1st menses are anovulatory
  - 15% resumes menses by 6 weeks
  - 45% by 12 weeks
  - 85 % by 24 weeks

Return of the Menses & Ovulation

- Lactating women:average time for 1st ovulation
  - 17 weeks if breastfeeding for 3 months
  - 28 weeks(190 days) if breastfeeding for 6 months
- Make sure to start your patient on contraception
  - 3rd postpartum week if not breastfeeding
  - 3rd postpartum months if breastfeeding

Care at Home

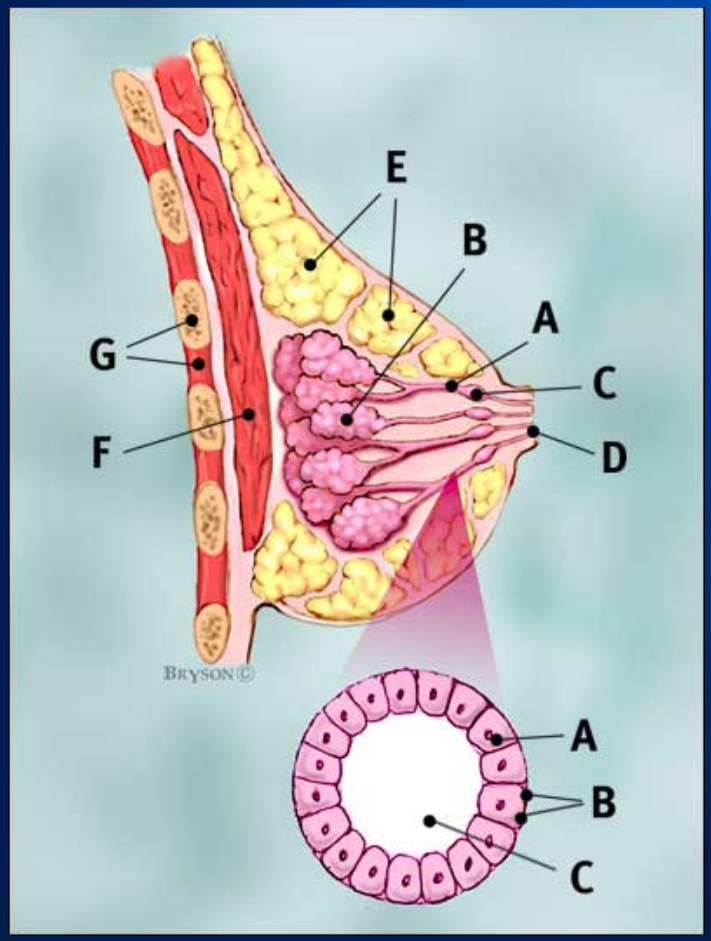
Return of menstruation and ovulation

- If not nursing
  : usually return within 6-8 weeks
- Lactating woman
  : first period may occur 2^{nd}~18^{th} months after delivery
- Ovulation
  - as early as 36-42 days(5-6 wks) after delivery
  - delayed resumption of ovulation with breast feeding
    but early ovulation is not precluded by persistent lactation
    → pregnancy can occur with lactation

CNM Implications for Care

- Patient education/ anticipatory guidance regarding
  - breastfeeding
  - menses
  - ovulation
  - p.p. contraception
- Do p.p.thyroid eval as a routine exam

Breast anatomy



- **A** ducts
- **B** lobules
- **C** dilated section of duct to hold milk
- **D** nipple
- **E** fat
- **F** pectoralis major muscle
- **G** chest wall/rib cage

Enlargement:

- **A** normal duct cells
- **B** basement membrane
- **C** lumen (center of duct)

Breast

- Breast or mammary glands undergo marked changes during pregnancy with development of alveolar tissue and the ductal system in preparation for lactation
- Lactating women- suckling stimulates sensory nerve endings in the nipple and areola, sending impulses to hypothalamus & stimulates prolactin release

Milk Synthesis

- Hypothalamus-withdrawal of placental and luteal sex hormone and infant's suckling result in depression of prolactin inhibiting factor(PIF)
- Increased prolactin synthesis & release into the circulation
- Breast milk synthesis and release into mammary alveoli

Breast Feeding

Lactation

- Colostrum

the deep lemon-yellow colored liquid secreted initially by the breasts

- expressed from the nipples by the second postpartum day
- contains more minerals and protein - globulin
  less sugar and fat
- Abs esp. IgA
- persists for about 5days
- gradual conversion to mature milk during the ensue 4weeks

- Milk
  - 600mL/day
  - major proteins -including α-lactalbumin, β-lactoglobulin and casein
  - interleukin -6, epidermal growth factor

Breast Feeding

Endocrinology of lactation

- Progesterone, estrogen, placental lactogen, prolactin, cortisol, insulin
  : appear to act in concert to stimulate the growth & development of milk-secreting apparatus of mammary glands

- **Prolactin** is essential for lactation
  Although plasma prolactin falls after delivery, suckling triggers a rise

- **Milk ejection or letting down reflex**
  : initiated especially by suckling
  → stimulates neurohypophysis to liberate oxytocin
  → contraction of myoepithelial cells in the alveoli & small milk ducts
  → milk expression from lactating breast

Breast Feeding

Immunological Consequences of Breast Feeding

- Predominant immunoglobulin in milk is secretory IgA
  : contains secretory IgA antibodies against E. coli
  → breast-fed infants are less prone to enteric infections
- Contains both T & B lymphocytes

Nursing

- Even though the milk supply at first appears insufficient, it become adequate if suckling is continued
- Nursing accelerates uterine involution
  : repeated stimulation of nipples release oxytocin
  → contracts uterine muscle

Breast Feeding

Lactation Inhibition

- Milk leakages, engorgement, & breast pain peak at 3 to 5 days postpartum
  → support with well-fitting brassiere or breast binder, ice packs oral analgesics

- Inhibitors
  Bromocriptine

bromocriptine has been associated with strokes, myocardial infarction, seizures, and psychiatric disturbances in puerperal women

Breast Feeding

Contraception

- Not needed in the first 3 weeks postpartum

- **Progestin** only contraceptives
  : mini-pills, depot medroxyprogesterone, levonorgestrel implant
  : do not affect the quality & increase the volume of milk very slightly
  → **<u>contraceptives of choice</u>** for breast feeding women

- **Estrogen-progestin contraceptives**
  : reduce the quantity & quality of breast milk
  : puerperal women have predisposition to venous thrombosis
  → increased by combination contraceptive pills
  ⇒ low dose pills are preferred if used in lactating women

Breast Feeding

Contraindications

- take street drugs
- do not control alcohol use
- have an infant with galactosemia
- have HIV infection
- have active, untreated tuberculosis
- take certain medications
- are undergoing breast cancer treatment (ACOG, 2000)
- Cytomegalovirus and hepatitis B virus are excreted in milk
- Women with active herpes simplex virus

Breast Feeding

Drugs secreted in milk

Most drugs given to the mother are secreted in breast milk
: but amount of drug ingested by the infant is typically small

Care of the breasts and nipples

Dried milk is likely accumulate & irritate the nipples
→ cleaning of areola with water & mild soap is helpful before and after nursing

Breast Feeding

Breast fever

- For the first 24 hours after development of lacteal secretion,
  : breasts to become distended, firm, & nodular
  ← exaggeration of normal venous & lymphatic engorgement of the breast
  (not the result of overdistention of lacteal system with milk)
- Puerperal fever from breast engorgement is common
  : 37.8~39℃, seldom persists for longer than 4~16 hours
  : **other causes (especially infection) of fever must be excluded**
- Treatment
  : binder or brassiere, ice bag, analgesics, pumping or manual expression

Breast Feeding

Mastitis

- Parenchymatous infection of mammary glands
- seldom appear before the end of the 1st week postpartum not until the 3rd or 4th week.
- unilateral, breast becomes hard, reddened and painful
- Signs : chills (1st), rigor, fever, tachycardia
- Etiology

  Staphylococcus aureus (most common)

  ※ breast abscess : caused by group B streptococcus

  - almost always from nursing infant's nose & throat

  → the organism enters the breast through the nipple at the site of a fissure or abrasion

Breast Feeding

- Treatment
  - swab and cultured
  - antimicrovial therapy
    : penicillin or cephalosporin
    : MRSA →vancomycin
    - continued for about 7-10days
  - Continue breast feeding
    : early Tx & continued lactation is successful in avoiding abscess formation

Breast abscess

- surgical drainage (essential) & general anesthesia

Non-Lactating Women

- Involution occurs
- Primary engorgement(2-4 days)-stasis of vascular & lymphatic circulation
- Secondary engorgement-due to distention of the lobules and alveoli with milk
- Without suckling & removal of milk, secretion of prolactin decreases and milk production ceases