

Guidelines For Placental Examination For The General Practicing Surgical Pathologist

Presented by:

California Society of Pathologists

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The guidelines of the California Society of Pathologists (CSP) are not rules but attempt to define principles of practice, which should generally produce accurate placental examination results. The pathologist may exceed an existing guideline as determined by the individual case and available resources. The guidelines should not be deemed inclusive of all proper methods of examination or exclusive of other methods of examination reasonably directed to obtaining the same results.

GUIDELINES FOR PLACENTAL EXAMINATION FOR THE GENERAL PRACTICING SURGICAL PATHOLOGIST

Objectives:

1. To aid the pathologist or pathology assistant carry out a basic, yet adequate gross placental examination that, at the same time, would create a useful and complete database of gross findings that would serve as the foundation for subsequent microscopic analysis and diagnoses.

Guidelines include: A) Types of specimens to be examined, B) Gross placental findings template, C) Recommendations for microscopic examination, and D) guidelines for possible forensic placenta/cases.

A. Types of specimens: Although the decision of what placentas should be sent to the surgical pathology laboratory for examination should be left up to the clinician, the pathologist can and should supply information regarding the types of specimens that may yield meaningful clinicopathological findings in a significant proportion of cases. This cooperation and coordination between the delivery suite and the laboratory can make everyone's task easier. Guidelines of indications for placental pathological examination are listed below. Similar guidelines (Arch Path & Lab Med, 121(5), May 1997) have recently been published.

Fetal/Neonatal indications:

- Prematurity,
- Stillbirth or perinatal death
- Major congenital anomalies and/or growth restriction
- Fetal anemia or hydrops fetalis
- Infection, fever, seizures, or sepsis
- Birthweight less than the 10th or greater than the 95th percentile
- Multiple gestation

Maternal indications:

- Premature delivery.
- Pregnancy or delivery associated with substantial difficulties, such as:
 - Systemic diseases (diabetes, pre-eclampsia, hypertension, collagen vascular disease)
 - Fever, infection
 - Recurrent pregnancy complications, recurrent fetal loss
 - Unexplained vaginal bleeding
 - Oligohydramnios or polyhydramnios
 - Trauma, Drug Abuse (see forensic cases, section D)

Placental Indications:

- Any lesion the obstetrician sees as unusual at delivery, such as:
 - Unusual placental size or shape
 - Cords under 30 cm or over 100 cm length at term
 - Cords with decreased or increased vascular spirals (normal 1 coil/5 cm)
 - Superficial venous thrombi over chorionic plate
 - Abruption, Maternal floor infarction, Pale or Edematous placentas,
 - Confirmation of imaging/ultrasound abnormalities made during gestation

B. GROSS PLACENTAL OBSERVATIONS: These observations are relatively easy and rapidly made, especially when using the simple "check-off" template illustrated below. These observations result in a valuable database for subsequent microscopic examination and final diagnosis. Forms of this type decrease the incidence of important omissions and significantly reduce dictation and transcription time. This form is also flexible, as unusual lesions or questionable gross findings can be described in detail under the section "Other." A very similar form is used for **TWIN PLACENTA**, with only minor

modifications concerning dividing membranes and anastomoses (**attached to the back of these guidelines**).

Placental "Check-Off" Template:

Condition of Specimen:

_____ fresh, _____ formalin fixed, _____ poorly preserved.

I. UMBILICAL CORD:

Vessels: _____ Three (3), _____ Two(2).

Diameter: _____ (cms); _____ firm or _____ easily compressed.

Coiling (spiraling) of umbilical cord vessels:

Coil Index: _____ normal (1coil/5cm), _____ increased, _____ decreased, _____ absent.

Length _____ (cms), and attachment to Chorionic Plate:

_____ central _____ marginal ("Battledore")

_____ eccentric _____ velamentous

Abnormalities present:

_____ No.

_____ Yes:

_____ true knot, _____ false knot, _____ stricture

_____ meconium stained

_____ maceration(dusky) _____ thrombosis

_____ calcification around vessels

_____ Other: _____

II. FETAL MEMBRANES / CHORIONIC PLATE SURFACE:

Intact _____, or Torn _____ Insertion _____ (normal, circummarginate, circumvallate, disrupted)

Meconium (greenish and mucoid):

_____ No.

_____ Yes: _____ amnionic surface only

_____ between amnion and chorion

_____ Discoloration, without mucoid substance; Description: _____

Abnormalities present:

_____ No.

_____ Yes:

_____ cloudiness, _____ foul odor, _____ exudate

_____ dusky (maceration), _____ amnion nodosum

_____ venous thrombi (yellow/white, firm vascular streaks)

_____ Other: _____

III. PLACENTAL PARENCHYMA:

Weight: _____ (without cord, membranes, and clots).

Calcifications: _____ Yes, _____ No

Unusual Placental Shape: _____ Yes.

Description: _____

Placental Thickness: _____ (cms).
_____ uniform
_____ variable: _____ thin/thick ranges (cms).

Abnormalities:

_____ No.

_____ Yes:

Color and Texture abnormalities:

_____ pale: _____ mild, _____ marked

_____ edematous: _____ mild, _____ marked

_____ hydropic villi: _____ focal, _____ diffuse

_____ congested (purple-red and "wet")

_____ firm/fibrous: _____ mild, _____ marked ("dry")

Infarction: _____ single, size _____, Location: _____ central, _____ peripheral

_____ multiple, size range _____ (cms), Location: _____

Abruption _____ single, size _____, Location: _____ central, _____ peripheral

_____ multiple, size range _____ (cms), Location: _____

Intervillous thrombosis: _____ single, size _____ (cms)

_____ multiple, size range _____ (cms)

Other, describe: _____

Identification of Microscopic Sections: Cassette #1 (cord and membrane roll), #2 (suspected area of thinning/abruption), etc.

C. MICROSCOPIC ANALYSIS: Bouin's fixative is favored over formalin because of the bloodiness of the tissues, which should be fixed for several hours then trimmed. Sections of placenta parenchyma are taken from the mid-to-central areas of the placenta, away from the margins. **Oriented sections** are taken that include attached chorionic plate and/or maternal decidua. These placental parenchymal sections should be taken from the most normal appearing areas. Obvious infarctions can be grossly identified and measured with perhaps one representative section if desired. The liberal use of "**Identification of Microscopic Sections**" is of great value. For example, cassette #3 is taken from the pale firm area, or grossly unremarkable placenta, or thin area, or thick and discolored area, or cystic lesion, etc.).

Recommendations for the number of routine microscopic sections:

1. Routine examination: FOUR. SECTIONS: Including one of both cord and fetal membrane roll in the same cassette, and three oriented sections as described above.

- a) cord and fetal membrane.
- b) chorionic plate with attached placenta (X2).
- c) maternal surface with attached placenta.

2. Fetal demise cases: SIX SECTIONS: This tissue examination may be the best chance to diagnose the cause of fetal death, especially with severely macerated fetuses. Sections include routine sections as described above plus two additional sections of grossly unremarkable placenta or grossly suspect lesions.

**** Important hint: It may be very helpful to the clinicians for the pathologist to remind them that the **Kleihauer-Betke** test, for recognition of **fetal-maternal hemorrhage**, may identify the cause of fetal demise, especially in cases of unexpected fetal demise during the third trimester. Gross placental examination may suggest this diagnosis if the placenta is pale or edematous or if large or multiple intervillous thrombi are found grossly or microscopically. The Kleihauer-Betke test may be positive for a month or so after fetal demise, if there are no significant antibody incompatibilities between fetal and maternal blood. Therefore, the temporal window for successful analysis of the mothers' blood is wide.

D. Forensic Cases: Clinical history is, of course, necessary for one to suspect this possibility. This would include a history of trauma, including domestic violence, or drug abuse leading to or temporally associated with abnormal delivery or uterine, fetal or placental damage.

I. Preliminary considerations:

- A. Know the coroner's policy. If the coroner doesn't have a policy, go through channels to insist that they promulgate one. This is for your protection.
- B. In many cases you won't know when the specimen comes in, or whether it will be a coroner's case or a civil litigation case or not. If there is a question of the former, go ahead and process the placenta routinely, with the following additions to routine procedure:
 1. Fresh specimen photography (full fetal and maternal disc surfaces, after removal of membranes but before removal of clots.)
 2. Measure, weigh and freeze all the clots.
- C. Preserve representative segments of the cord and (preferably) one full-diameter cross-section of the disc.

II. Known coroner's cases:

- A. Have the hospital laboratory sequester all body fluid samples drawn from the mother on admission and from the baby at delivery.
- B. Follow your local coroner's policy. Failing that, you can elect to either (a) process the specimen routinely, with the above additions, or (b) describe and photograph the fresh specimen and fix and hold it intact for the coroner.
 1. Special note for out-of-hospital deliveries. Your hospital protocols probably do not allow you to accession a specimen recovered in the field. If these come into your possession, the coroner and/or the police should be notified to come and pick them up immediately. Refrigerate the specimen in its original wrapping or container (garbage bag, towel, etc.), discarding nothing. Get a written receipt and ID when handing it over to law enforcement.
- C. If you proceed to dissect the placenta, the guidelines given in the previous sections for nonforensic cases should be followed, with the following additional suggestions:
 1. During dissection of the fixed disc, take a specimen photograph of a full-diameter cross section (slice), to show differences in thickness and color. This is helpful in documenting the presence, size, and dating of abruptions. You are looking for a cupping or compression of portions of the disc, and areas of hemorrhage or anemia caused by the abruption.
 2. If by chance you have a placenta that was delivered out of the hospital, photograph and section the end of the umbilical cord. Does it appear cleanly severed or torn off? Hemorrhage and vital reaction at this site pertain to the issue of live birth.

3. Coroner's cases are usually suspected trauma cases or drug cases. As to suspected trauma cases, these break out into two major subclass – penetrating trauma and nonpenetrating trauma. Nonpenetrating placental trauma is of three kinds: (a) Direct placental trauma (placental laceration); (b) indirect placental trauma (abruption); and (c) transmitted placental trauma (trauma to the fetus without detectable trauma to the placenta.) Of these, indirect placental trauma is by far the most common.
4. Any nonpenetrating placental trauma can, at the time of delivery, be either acute, subacute, or chronic. This has two practical consequences:
 - a. The dating of the injury is a matter for subspecialists in perinatal pathology. But the surgical pathologist should preserve enough gross and histologic evidence so that this can be done.
 - b. Placental trauma will usually be accompanied by traces of fetal anemia (empty vessels and pallor in acute cases; edema, increased NRBC's and extramedullary erythropoiesis in subacute cases.)

As to nonpenetrating placental trauma of all three kinds, the most common causes are (a) automobile accidents, and (b) domestic violence. Automobile accidents need not be major accidents to cause indirect placental trauma. Term gravidas may omit seatbelts because fastening and unfastening them is cumbersome. Gravidas commonly conceal domestic violence, and therefore this history is unlikely to be present in the chart. When abruption occurs in the third trimester, especially without a clear-cut reason (such as cocaine/methamphetamine intoxication or anticoagulant intake) or with a questionable history such as a household fall or an automobile accident days or weeks earlier, which was never reported, domestic violence should be considered in the differential diagnosis. It's incidence in gravidas is 14% to 20%. (Parker, McFarlane & Soeken, 1994; Pak, Reece & Chan, 1998). Such cases should be discussed with the attending obstetrician. Note that some states now have mandatory reporting laws for suspected domestic violence, and you may be a mandated reporter. Hospital social services should be made aware of the differential diagnosis.

References:

1. Pathology of the Placenta. K. Benirschke and P. Kaufman. Springer-Verlag, New York, Third Edition, 1995.
2. Arch Path & Lab Med, Conference on Placenta Pathology, Special Issue; 121(5), May 1997.
3. Pathology of the Placenta, S.G. Romansky. CD-ROM, Universal Multimedia, Inc. (www.uminc.com). 1998.

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Twin placentas

I. UMBILICAL CORDS:

Identified as twin A and B: Yes, No. (**see micro ID bottom)

How identified: description: (A/B, #1 \#2, etc.) _____

Vessels: Cord A: three (3), two (2).

Cord B: three (3), two (2)

Diameter: Cord A: cm, firm, easily compressed

Cord B: cm, firm, easily compressed.

Attachment to the chorionic plate:

Cord A: length: cm. Coil index: normal (1 coil/5cm)
 increased, decreased, absent

Cord B: length: cm. Coil index: normal (1 coil/5cm),
 increased, decreased, absent

Cord A attachment: central, marginal
 eccentric, velamentous

Cord B attachment: central, marginal
 eccentric, velamentous

Abnormalities of Cord:

No.

Yes (noted as Twin A, B, or both):

true knot, false knot, stricture

meconium stained

maceration (dusky), thrombosis

calcification around vessels

Other: _____

II. FETAL MEMBRANES, DIVIDING MEMBRANES:

Dividing Membrane: Intact, Torn, Absent (Monoamnionic)

Fetal vessels cross under (Monochorionic)

Fetal vessels do not cross under (Dichorionic)

Cannot tell (see microscopic of dividing membranes)

Meconium: No

Yes: mucoid consistency:

amnionic surface only: twin A, twin B

between amnion and chorion: twin A, twin B

Discoloration (without mucoid consistency): Description _____

Abnormalities: No

Yes (noted as Twin A, B, or Both):

cloudiness, foul odor, exudates

dusky (maceration), amnion nodosum

Other: _____

III. PLACENTA:

Fused placenta _____ Separate placentas, _____
weight: _____ weights: Twin A _____, Twin B _____
(Weights without cord, membranes, and clots)

Calcifications: _____ No: Twin A _____, Twin B _____
_____ Yes: Twin A _____, Twin B _____

Unusual Placental Shape(s):
_____ No. _____ Yes, describe: _____

Placental Thickness:
_____ uniform between twins:
average thickness _____ (cms)
_____ variable between twins: describe: _____
_____ thin/thick range (cms)

Abnormalities: _____ No.
_____ Yes (noted as Twin A, Twin B, or both):
Color and Texture abnormalities:
Differences between Twins: _____ No, _____ Yes.
_____ pale: _____ mild, _____ marked
_____ edematous: _____ mild, _____ marked
_____ hydropic: _____ focal, _____ diffuse
_____ congested (purple-red and "wet")
_____ firm/fibrous: _____ mild, _____ marked ("dry")

Infarctions : _____ single, size _____,
Location: _____ central, _____ peripheral
_____ multiple, size range _____ (cms),
Locations: _____

Abruption: _____ single, size _____,
Location: _____ central, _____ peripheral
_____ multiple, size range _____ (cms),
Locations: _____

Intervillous thrombosis: _____ single, size _____ (cms)
_____ multiple, size range _____ (cms)

Other, describe: _____

Identification of Microscopic Sections:

(**) Identification of twins should be coordinated with obstetrics in order to minimize confusion regarding twin identification. For example "Twin A" referred to in the clinical notes may become "Twin B or #2" when a C-section is done. A specific identification-protocol decided upon between obstetrics and pathology, is helpful.